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# THE EFFECTS OF TRADE AND EXCHANGE RATE POLICIES ON AGRICULTURE IN NIGERIA

T. Ademola Oyejide

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# FOREWORD

The past decade has been one of major turbulence in the global economy, including rapid inflation, oil price shocks, extraordinary rise and decline in food prices, and low real interest rates encouraging borrowing that has later proven unsustainable. The process of managing that turbulence, along with industry-oriented development strategies, has led many developing countries to grossly overvalue their exchange rates. The extent to which overvaluation discriminates against exports and agriculture in general and agricultural exports in particular has received increasing emphasis in recent years.

Thus, the International Food Trade and Food Security Program at IFPRI has undertaken a series of country studies on the foreign trade and exchange rate regimes as they relate to the structure of incentives for agriculture in developing countries.

IFPRI's comparative studies on this topic have included *The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia: 1953-1978,* Research Report 24, by Jorge García García, "Coffee Boom, Government Expenditure, and Relative Prices in Agriculture: The Colombian Experience," also by Jorge García, with Gabriel Montes, and *Agriculture and Economic Growth in an Open Economy: The Case of Argentina,* Research Report 36, by Domingo Cavallo and Yair Mundlak. Research under way includes parallel studies on Zaire, the Philippines, Chile, Peru, and Thailand.

This research report, a part of that larger, integrated effort, focuses on Nigeria, a major oil exporter. The development of a booming export sector, such as oil in the 1970s, is likely to have strong repercussions on the competitiveness and growth of other tradable sectors in the economy, agriculture being particularly affected because it is more trade-oriented than other sectors. Thus Nigeria presents an opportunity to learn from an important example of a particular type of regime.

IFPRI is organizing a policy workshop to take place in 1987 where this series of country studies on the effects of foreign trade and exchange rate policies on agricultural growth will be presented. These studies will provide a broad picture of the process through which trade and exchange rate policy influences agricultural growth in developing countries, and they will provide supporting quantitative evidence of their relative effects.

Professor T. Ademola Oyejide, from the Department of Economics, University of Ibadan, came to IFPRI as a visiting fellow to work on this study on Nigeria. Because of his experience in trade and exchange rate policy in Nigeria, including his well-known study on the structure of industrial protection, and his knowledge of the agricultural sector, he is particularly qualified to develop the analytical framework and implement the empirical analysis.

This study was partially funded by the Ford Foundation's office in Lagos, Nigeria, and by the International Development Research Centre of Canada. IFPRI is particularly grateful to these two organizations for their encouragement and support of this work on Sub-Saharan Africa.

John W. Mellor

Washington, D.C.
October 1986

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This study is part of a series dealing with the impact of trade and exchange rate policies on agricultural incentives in several countries. It was funded by the International Food Policy Research Institute (IFPRI), the International Development Research Centre (IDRC) of Canada, and the Ford Foundation. It is a great pleasure to acknowledge the generous financial support of these organizations.

Work on the project was carried out at IFPRI and the University of Ibadan, both of which provided a conducive atmosphere for work. However, my teaching and administrative responsibilities as head of the Department of Economics at the University of Ibadan created unavoidable distractions and delays that must have sorely tried the patience of my colleagues at IFPRI.

John W. Mellor, director of IFPRI, maintained a sustained and lively interest in this research project throughout its duration. His general encouragement and incisive comments have been valuable in shaping its overall direction. Alberto Valdés, the project leader, offered useful comments, suggestions, and criticisms at every stage of the research. His ability to succinctly articulate policy issues and link them with a relevant theoretical framework and analytical techniques assisted me immensely and is gratefully acknowledged.

I am also indebted to Larry Sjaastad, Romeo Bautista, Tshikala Tshibaka, and Chris Delgado, with whom various aspects of this study were discussed.

My deep appreciation for competent computational assistance, pleasantly provided, is due to Steve Haykin.

Finally, my greatest debt is to the members of my family: Tinuke, Dayo, Dunmomi, Dotun, and Diran. They sustained me and at the same time selflessly allowed me to be away as often as my research commitments required. Much more is owed to them than can be conveyed in this acknowledgment.

# 1

# SUMMARY

Before the 1970s agricultural exports were the backbone of the Nigerian economy. By the mid-1970s, however, two phenomena caused the average annual growth rate for export crops to decline by 17 percent, food crop production to fall by 2 percent, and domestic retail food prices to soar. The first was the economic boom resulting from the dramatic rise in oil prices, and the second, government policies to encourage industrialization. At a time when GDP was growing by more than 7 percent a year, resources shifted away from agriculture.

This study focuses on the effects of Nigeria's trade and exchange rate policies on agricultural incentives during 1960-82, especially during the 1970s, the period of the oil boom. It attempts to determine the degree of protection granted to agriculture compared with other sectors, and it assesses how these policies affected the allocation of resources both within agriculture and among the other sectors.

Nigeria's development strategy assigned agriculture the role of a resource reservoir for other sectors during the 1960s. Trade, exchange rate, and other macroeconomic policies were designed and implemented to extract resources from agriculture for the development of manufacturing and its infrastructure. The oil boom of the 1970s only strengthened this policy of transferring resources.

Despite its decline, agriculture is still one of the largest sectors in the economy. In 1982 it still accounted for 59 percent of the labor force, down from 75 percent. Because Nigerian agriculture is labor-intensive, labor shortages represent the most significant constraint to growth. Rural wages rose as the result of rural-urban migration at a time when prices paid to farmers were declining.

Before the 1970s the consumer price index for food and the relative food crop prices paid to farmers largely moved together, but during the 1970s they began to diverge. Retail food prices rose 18 percent higher than other costs, while producer prices declined relative to the consumer price index.

Late in the 1970s, the need to diversify the economy brought about a policy reversal. Agricultural production was encouraged by the removal of agricultural export and sales taxes and by increased tariffs and bans on agricultural imports. Agricultural inputs, particularly fertilizers, were subsidized. By 1982, all export crops, except cotton, and all food crops were positively protected.

Exchange rate policy is particularly a problem in boom countries like Nigeria where large capital inflows cause the real exchange rate to appreciate in favor of the domestic currency. But policies to keep the real exchange rate low may impede the growth of agricultural exports. Between 1974 and 1978 Nigeria allowed the naira to appreciate against the U.S. dollar and the British pound, and the resulting overvaluation substantially reduced production incentives for nonoil tradables, particularly agricultural products.

Other trade policies initiated to correct imbalances limit imports to the amount of foreign exchange earned through exports. Quantitative import licenses and exchange controls are costly and complex to administer, however, and encourage government corruption.

Trade and exchange rate policies influence production incentives, which in turn affect the flow of resources among sectors. When one sector is protected, another sector is likely to suffer adverse consequences. In this study an incidence of protection parameter, called omega, measures the effects of protectionism and how the effects are shared among sectors. For example, the study shows that an import tariff resulted in a 55-90 percent tax on exportables, including agricultural exports.

The study concludes that the oil boom adversely affected Nigeria's agriculture. But changes in detrimental trade and exchange rate policies alone will probably not bring about a sufficient expansion of agricultural output. Nor is agricultural price intervention alone likely to solve agriculture's problems. Such changes must be accompanied by programs to develop and distribute new technology, rural infrastructure, and other rural investment. Most importantly, policymakers must consider the effects on other sectors before implementing policies to support growth in one sector.

# 2

# INTRODUCTION

Although developments in the oil sector have dominated Nigeria's economic scene since the mid-1970s, the country remains basically agricultural. More than 70 percent of its population depends on agriculture, which contributes roughly 25 percent of GDP and 60 percent of nonoil exports. In fact, before the rapid rise in oil prices and the massive increase in oil export revenue, Nigeria was a major exporter of agricultural produce, especially cocoa, groundnuts, cotton, palm oil, palm kernel, and rubber. Since then, however, both the volume and the range of agricultural exports has declined sharply, and agricultural imports have increased dramatically. In addition, Nigeria no longer produces sufficient food for the country's large and rapidly growing population.

The 3-4 percent average annual output growth rates for agricultural export and food crops achieved in the 1950s and 1960s gave way to substantial declines throughout the 1970s and into the early 1980s. The average annual rate of real output growth for food crops fell to about 2 percent a year during the 1970s. Between 1970 and 1975, however, the output of export crops dropped 17 percent, and by 1982 export crop output had declined by more than 20 percent. Reflecting the dismal performance of Nigeria's agricultural sector, the food import bill rose more than 10-fold in 1970-80, and domestic food prices also rose dramatically.

In contrast to the poor output growth performance of the agricultural sector, the average annual real GDP growth rate was more than 7 percent during 1970-80. This reflected the rather swift recovery from the 1967-70 civil war, combined with the effects of the oil boom, particularly in 1973-75 and 1979-80. This overall growth rate was nearly double the rate of about 4 percent during the 1950s and the 1960s.

Several macroeconomic policies and events presumably have contributed to the extraordinary decline of Nigeria's agricultural sector at a time of high overall growth. A major factor is Nigeria's whole-hearted embrace since the 1960s of the import-substitution-industrialization strategy so popular among the developing countries. Under this scheme, domestic manufacturing industries have received high levels of protection through tariffs and other quantitative import restrictions. Although this has provided large incentives for industry, it has had the opposite effect on other sectors, particularly agriculture. A second major event has been the oil boom with its associated capital inflows. This has helped to establish an exchange rate regime that sustains an overvalued domestic currency, which has squeezed nonoil tradables, particularly agricultural commodities.

Several important policy issues are raised by the disincentive effects on agricultural production—both for export and for domestic consumption—of major macroeconomic policies, particularly trade and exchange rate policies. Some of these issues are general in the sense that they pose questions about the global impact of these policies on production incentives. Others relate primarily to the different effects of policies on production incentives across and within sectors of the economy.

The objectives of this study derive from these policy concerns. More specifically, it attempts first, to establish, in terms of relative prices, the degree of protection accorded by trade and exchange rate policies to agriculture vis-à-vis other sectors of the economy; second, to assess how trade and exchange rate policies affect the allocation of resources among sectors and within agriculture itself, particularly in the production of food and export crops; and finally, to ex-

amine how a dominant sector, petroleum oil, has affected production incentives in agriculture.

Because of significant data limitations, it has not been possible to provide definite answers to some of the important questions raised in this study. But until more detailed studies based on better data are available, this study demonstrates the effects on agriculture of economywide trade and exchange rate policies and the extent to which the "oil syndrome" has adversely affected both food and export crop components of agriculture.

# 3

# STRUCTURE AND GROWTH OF NIGERIAN AGRICULTURE

Agriculture has always been a large sector of Nigeria's economy.[1] In 1950, it accounted for 69 percent of GDP, but its share of GDP fell rather rapidly to only 49 percent in 1970 and to about 22 percent in 1982. But agriculture has continued to be the most important employer of labor, accounting for 64 percent of the total labor force in 1975, and 59 percent in 1982. The performance of this sector remains critical to the economy's overall growth.

Agriculture has important linkages and interrelationships with the rest of the economy.[2] As in most other developing countries where agriculture is a large sector of the economy, Nigerian agriculture interacts with, and is highly vulnerable to, changes in other sectors. This includes macroeconomic policies not specifically targeted at agriculture.

Nigeria's development strategy of the 1960s and 1970s treated manufacturing industry as the leading sector, whereas agriculture was assigned the role of a reservoir that provided resources for or absorbed them from other sectors (particularly industry) as required. The central question in this strategy was how to extract an adequate surplus from agriculture to finance industrial growth and how much food and labor could be transferred from agriculture without destroying the sector's capacity for continued, self-sustained growth.[3] This strategy implied a number of potential conflicts. The need for increased domestic food production may work to the detriment of the objective of increased foreign exchange earnings through the expansion of the output of export crops, particularly where food and export crops are produced in the same production structure. Similarly, when agriculture is heavily taxed to generate the savings for financing industrial capital formation, real farm income and production incentives in agriculture are reduced. As a result, the required expansion of output of food and export crops may not be achievable.[4]

The implied trade-offs in general macroeconomic policy objectives illustrate the importance of linkages between agriculture and other sectors of the economy. They also establish the need for a careful analysis of the structure and growth of agriculture over time in relation to general macroeconomic policies to determine whether these policies assist in creating an environment in which agriculture would serve as a resource reservoir while sustaining itself.

## Structure and Performance of Agriculture

The national accounts of Nigeria include four agricultural subsectors—crops, livestock, forestry, and fishing. This study is confined to the agricultural crops subsector, which accounts for 70-80 percent of total

[1] Appropriate data for measuring the relative significance of agriculture in Nigeria's economy are available from Nigeria, Federal Office of Statistics, *National Accounts of Nigeria* (Lagos: FOS, 1978); and Nigeria, Federal Office of Statistics, *Economics and Social Statistics Bulletin* (Special Series), January 1984.

[2] See Bruce F. Johnston and John W. Mellor, "The Role of Agriculture in Economic Development," *American Economic Review* 51 (September 1961): 566-593.

[3] See Food and Agriculture Organization of the United Nations, *Agricultural Development in Nigeria, 1965-1980* (Rome: FAO, 1986).

[4] An earlier study of this conflict is reported in Godwin E. Okrume, *Foreign Trade and the Subsistence Sector in Nigeria: The Impact of Agricultural Exports on Domestic Food Supplies in a Peasant Economy* (New York: Praeger, 1973).

agriculture. The crops subsector has two major subdivisions, crops produced for domestic consumption and those produced for exports. This broad classification is not exclusive. Some of the traditional export crops have also been used for domestic food. Examples include palm oil, tea, coffee, and groundnuts, particularly in the form of groundnut oil. In fact, some have dropped out of the list of export crops in more recent times, partly as a result of the decline in total production but also because of increased domestic demand for their use as food. Thus, agricultural exports as a proportion of total exports fell from 97 percent to 4 percent from 1960 to 1980.

Traditionally, the major export crops include cocoa, groundnuts, palm kernel, palm oil, rubber, cotton, coffee, tea, and soybeans. By the 1980s, cocoa was providing more than 50 percent of total agricultural export earnings. Domestic demand also exists for some of the exportable crops such as cocoa and cotton, as industrial raw materials.[5] The food crops category also is not exclusive because it includes both traded and nontraded food crops. The major traded food crops are maize, rice, and wheat. Other food crops include root crops such as yams, cassava, and cocoyams, as well as several types of grains, such as millet and sorghum and pulses. Many of these are potentially tradable. Hence, incentives for their production and consumption are significantly influenced by traded food prices.

There is considerable disagreement among the different data sources about the actual amounts and growth rates of agricultural crops produced in Nigeria.[6] As a result, available estimates diverge widely. The differences are particularly large for the nontraded root crops, including cassava, yams, and cocoyams. There is also reason to suspect that the production figures for exportable crops may be underestimated, because the share of crops that are domestically consumed, such as palm oil and groundnuts, is not known with a reasonable degree of certainty.[7]

Because of these problems, it is not possible to provide generally accepted figures that demonstrate the structure and performance of Nigerian agriculture in a definitive way. In spite of this reservation, the following is an attempt to sense the general trends. The national accounts indicate that during 1950-57, GDP grew at 4.0 percent, during 1960-66 at 4.7 percent, and during 1970-75 at 8.4 percent per year in constant prices. During these same periods, the output of agricultural crops grew 3.2 percent, 1.3 percent, and −3.6 percent per year. Teal has produced revised estimates for these periods showing the growth patterns of export and food crops separately.[8] According to these estimates, the output of export crops grew at an average annual rate of 4.7 percent in 1950-57, 7.4 percent in 1960-65, and declined by 17.3 percent in 1970-75. The corresponding average annual growth rates for food crops were 3.2 percent, 0.4 percent, and −2.1 percent. The general trend implicit in these figures is that total real output of agricultural export crops declined at an annual rate of about 30 percent during the period 1973-82. For the food crops, however, Norton estimates that domestic production probably grew at an average rate of 2.7 percent, which is no growth at all on a per capita basis for 1973-82.[9] In other words, the growth performance of Nigerian agriculture worsened between

[5] Nigeria, Federal Office of Statistics, *National Accounts of Nigeria.*

[6] Data sources include the following agencies in Nigeria: Federal Office of Statistics, which has primary responsibility for all official data gathering, processing, and publication; Federal Ministry of Agriculture; and Central Bank of Nigeria. Sources outside Nigeria are the Food and Agriculture Organization of the United Nations and the U.S. Department of Agriculture.

[7] See Francis Teal, "The Supply of Agricultural Output in Nigeria, 1950-1974," *Journal of Development Studies* 19 (January 1983): 191-206, and M. O. Ojo, "Food Supply in Nigeria, 1960-1975," in Central Bank of Nigeria, *Economic and Financial Review* 15 (December 1977).

[8] Teal, "Supply of Agricultural Output."

[9] See Roger D. Norton, "Pricing Policy Analyses for Nigerian Agriculture," West Africa Regional Office, The World Bank, September 1983 (mimeographed).

1960 and 1982, with the rate of decline being particularly high since the mid-1970s. Domestic food production appears to have stagnated, especially since the mid-1970s, while output of export crops has fallen rather dramatically.

The trend in domestic agricultural crop production is reflected in the changing pattern of agricultural trade. The transformation of Nigeria from a net exporter of agricultural crops to a large-scale importer of agricultural food products was particularly marked during the period 1973-82. Export earnings fell from 332 million naira (₦) in 1973 to about ₦120 million in 1982,[10] as the major agricultural export crops decreased in number, output, and value. In contrast, increases in income and changes in consumer taste boosted the import of food products. Imports of some grains, such as wheat, rice, and maize, grew at an average annual rate of more than 50 percent, with the result that the value of agricultural commodity imports rose from about ₦126 million in 1973 to well over ₦2,000 million in 1982. It would appear that traded crops now constitute a fairly large proportion of Nigeria's total food supply.

## Constraints on Agricultural Growth

The economic performance of Nigerian agriculture has been influenced since the mid-1970s by the structural changes in the economy that have accompanied the oil boom (see Chapter 5). The principal mechanisms through which the oil boom has affected agriculture are the relative product and factor prices.

Labor, land, capital, and water are the primary resources used in Nigeria's traditional agriculture. Therefore, inadequacies in the labor market, the land tenure system, technology, and infrastructural facilities represent significant impediments to expanding agricultural output.

Research and development of improved seeds, as well as the introduction of new technological packages through extension services and the provision of infrastructural facilities, accompanied the expansion of agricultural export crops during the late 1950s and early 1960s. Only recently have similar facilities been extended to the domestic production of food crops. In fact, as late as 1969, major production programs for food crops were considered unnecessary.[11] Although use of fertilizer and chemical inputs is spreading rapidly, it is still true, by and large, that increases in food production are based on the land and labor of the small-scale farmer who uses traditional technology with rudimentary capital in a rainfed system, just as in the past. Land does not constitute a binding constraint in this system. It is estimated that cultivated land totals 34 million hectares out of 72 million hectares of potentially cultivatable land.[12] In fact, the predominant fallowing practices are based on the existence of a fairly large average surplus amount of land.[13] In comparison to land, labor represents a major constraint on the expansion of agricultural output in Nigeria's prevailing farming system.

There has been a growing consensus in recent years that labor shortages—and the corresponding high costs of labor—have played a central role in agriculture's poor performance.[14] The problem of labor shortage is worsened by the unusually labor-intensive nature of Nigerian agriculture. Evidence shows that mixed crop farming enterprises require more than 100 man-

[10] In 1982, one Nigerian naira (₦) was equivalent to U.S. $1.49.

[11] See Consortium for the Study of Nigerian Rural Development, *Strategies and Recommendations for Nigerian Rural Development, 1969-1985* (Lagos: CSNRD, 1969).

[12] See Norton, "Pricing Policy Analyses," p. 2.16.

[13] The fallowing farming practice is also referred to as a system of shifting cultivation. See Food and Agriculture Organization of the United Nations, *Agricultural Development in Nigeria;* and Consortium for the Study of Nigerian Rural Development, *Strategies and Recommendations.*

[14] See Carl K. Eicher and Doyle C. Baker, *Research on Agricultural Development in Sub-Saharan Africa—A Critical Survey,* International Development Paper No. 1 (East Lansing, Mich.: Michigan State University, 1982).

days per hectare per year and that labor intensity for root crop production reaches 200 man-days per hectare per year.[15] Macroeconomic developments in the rest of the economy have contributed to the labor shortage problem of agriculture. Expanding off-farm income-earning opportunities[16] and the introduction of universal primary education[17] in the 1970s boosted the rate of rural-urban migration,[18] to the detriment of the agricultural sector.

Another significant development is the increased dependence on hired agricultural labor instead of family labor.[19] The macroeconomic policies that have resulted in high rates of rural-urban migration have clearly contributed to the increased need for hired labor on the farms. This shift has tended to increase explicit production costs in agriculture. In various Agriculture Development Projects (ADPs) located in the northern part of Nigeria, the average farmer spent about ₦200 on hired labor in 1981 to earn an average farm income from crop sales of about ₦ 500.[20] In the southwestern part of Nigeria, there is extensive reliance on contract harvesting with teams of hired labor coming in regularly from other parts of the country. As a result, hired labor now represents a much more significant part of the farmer's production costs across the country than in the 1960s. Just as off-farm work opportunities have forced farmers to rely more on hired labor, the costs of hired labor have risen in line with the rapidly increasing urban wage rate. This has created severe pressures on Nigerian agriculture from the labor cost side.

There are no official time-series data on rural wage rates. However, a series constructed from available scattered point estimates and their implicit rates of growth over time is presented in Table 1.[21] When the index of the estimated nominal rural wage rate is deflated using the index of consumer prices, an index of real rural wages is produced. A similar procedure is used to derive the real minimum wage rate index. It is clear from these estimates that both the rural wage rate and the minimum wage rate increased rapidly through the 1970s and into the 1980s (Figure 1). This rapid increase in the nominal wage rate is carried over to the real rate. To the extent that the nominal rural wage rate and the minimum wage rate have grown much faster than the consumer price index, the indexes of real rural and minimum wage rates have been characterized by an upward trend at least until 1975, when the rural wage began to decline (see Figure 2). The rate of growth of the real rural wage rate was particularly rapid during 1973-75, but it tapered off during 1975-82.

Given a land surplus, it is possible to increase agricultural output by expanding cultivated area without a significant breakthrough in yield technology. However, an increase in area cultivated would have to be worked with hired labor because the

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[15] Norton, "Pricing Policy Analyses."

[16] Off-farm income-earning opportunities have expanded, particularly during the 1970s, as the service sector has grown rather rapidly with the increase in income induced largely by the oil boom.

[17] Primary school enrollment increased from less than 40 percent to more than 95 percent of school-age population during the 1970-80 decade.

[18] No time-series data on the rate of rural-urban immigration are available. However, most observers believe that the rate has been high. See Eicher and Baker, *Research on Agricultural Development in Sub-Saharan Africa.*

[19] In most other Sub-Saharan African countries, the use of hired labor is not extensive (Eicher and Baker, *Research on Agricultural Development in Sub-Saharan Africa).* In Nigeria, the pattern was roughly the same during the 1960s, except at harvesting time when the use of hired labor might exceed 20 percent of total labor. See David W. Norman, *Economic Analysis of Agricultural Production and Labor Utilization among the Hausa in the North of Nigeria,* African Rural Employment Paper No. 4 (East Lansing, Mich.: Michigan State University, 1973). However, Norton shows that a marked shift toward greater dependence on hired labor occurred during the 1970s (Norton, "Pricing Policy Analyses").

[20] Norton's figures are based on samples drawn from 10 agricultural development projects in Nigeria (Norton, "Pricing Policy Analyses," p. 53).

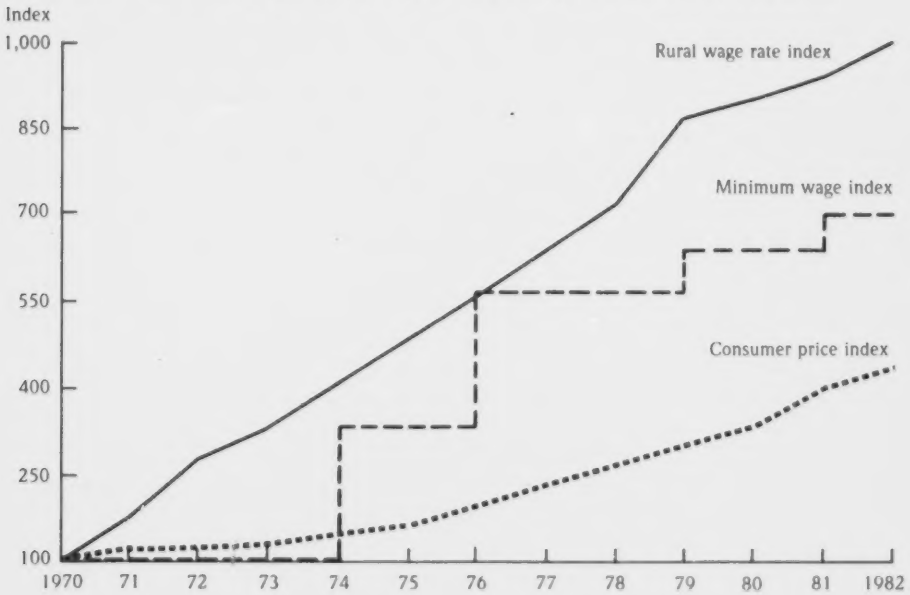
[21] These include estimates of rural wage rates of ₦0.60 for 1970, ₦5.20 for 1979, and ₦6.50 for 1982, as reported in Norton, "Pricing Policy Analyses."

## Table 1—Minimum and rural wage rates, 1970-82

| Year | Estimated Rural Wage Rate | Rural Wage Rate Index | Minimum Wage Rate Index | Consumer Price Index | Real Rural Wage Rate Index | Real Minimum Wage Rate Index |
|---|---|---|---|---|---|---|
| | (naira/day) | | | (1970 = 100) | | |
| 1970 | 0.60 | 100 | 100 | 100 | 100 | 100 |
| 1971 | 1.06 | 177 | 100 | 116 | 153 | 86 |
| 1972 | 1.52 | 253 | 100 | 119 | 213 | 84 |
| 1973 | 1.98 | 330 | 100 | 127 | 260 | 79 |
| 1974 | 2.44 | 407 | 337 | 144 | 283 | 234 |
| 1975 | 2.90 | 483 | 337 | 161 | 300 | 209 |
| 1976 | 3.36 | 560 | 561 | 198 | 283 | 283 |
| 1977 | 3.82 | 637 | 561 | 231 | 276 | 243 |
| 1978 | 4.28 | 713 | 561 | 269 | 265 | 209 |
| 1979 | 5.20 | 867 | 645 | 300 | 289 | 215 |
| 1980 | 5.40 | 900 | 645 | 331 | 271 | 195 |
| 1981 | 5.60 | 934 | 702 | 400 | 233 | 176 |
| 1982 | 6.00 | 1,000 | 702 | 431 | 232 | 163 |

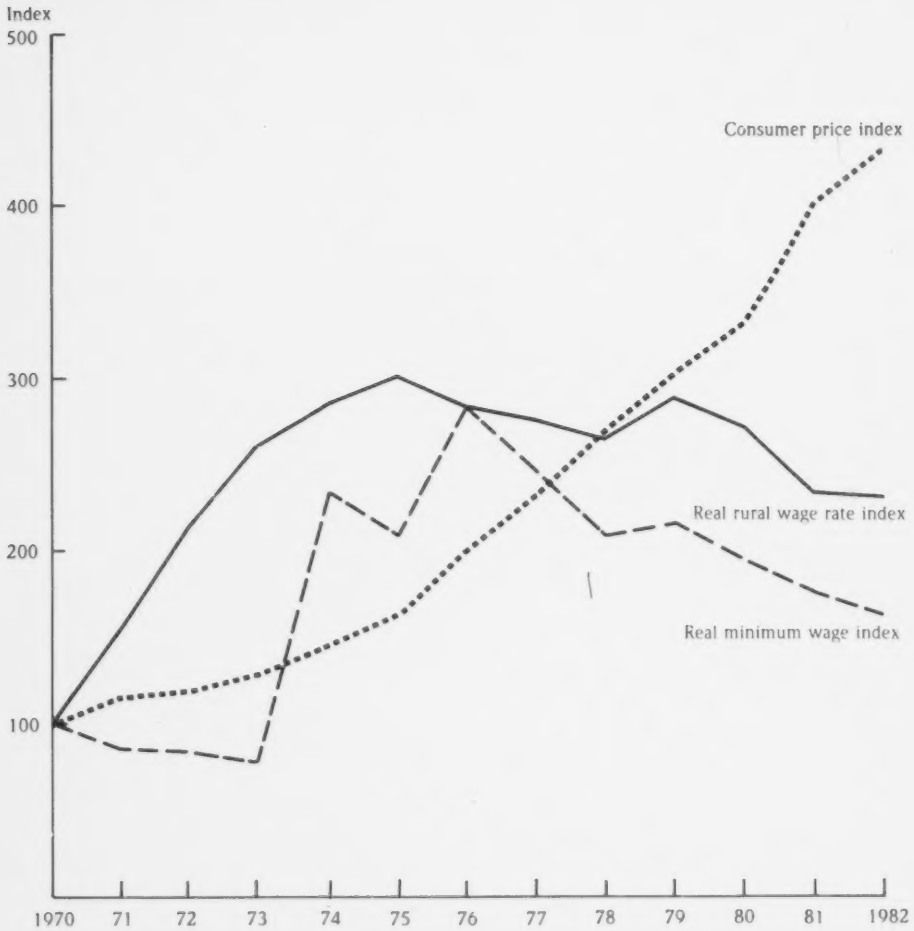
Sources: The rural wage rate is constructed from scattered point estimates because there are no official time-series data on wages. The minimum wage rate index is derived from budget documents provided by the Federal Government of Nigeria. Consumer prices were obtained from the Nigerian Federal Office of Statistics in Lagos. The real rural wage and real minimum wage rates are obtained by using the index of consumer prices as a deflator.

## Figure 1—Nominal wage rates and consumer price indexes, 1970-82




Sources: The rural wage rate is constructed from scattered point estimates because there are no official time-series data on wages. The minimum wage rate index is derived from budget documents provided by the Federal Government of Nigeria. Consumer prices were obtained from the Nigerian Federal Office of Statistics in Lagos.

**Figure 2—Indexes of real minimum and real rural wage rates, and consumer price index, 1970-82**




Sources: The rural wage rate is constructed from scattered point estimates because there are no official time-series data on wages. The minimum wage rate index is derived from budget documents provided by the Federal Government of Nigeria. Consumer prices were obtained from the Nigerian Federal Office of Statistics in Lagos. The real rural wage and minimum wage rates are obtained by using the index of consumer prices as a deflator.

existing land tenure system precludes large-scale mechanization. This is the sense in which labor and its rising costs represent the principal constraint on the growth of Nigerian agriculture.

## Agricultural Prices

A sufficient increase in output prices could, in principle, offset the high labor costs confronting Nigerian farmers. Hence, an examination of agricultural output prices is required.

Government intervention in Nigeria's agricultural marketing and pricing system makes a distinction between export and food crops even though a number of agricultural commodities belong in both categories. Except for these cases, export crops traditionally have had their marketing channels and domestic produce prices determined by the policies and operations of commodity boards. Through time, Nigerian marketing (commodity) boards have played an important role in organizing the purchase and sale of export crops such as cocoa, rubber, groundnuts, cotton, palm kernel, palm oil, and soybeans.[22] Producers are required by law to sell their crops at officially determined prices to the commodity boards, which are the sole exporters of specified crops.

Intervention in food crops is much more limited and started much later. Purchase and sale is handled by the private sector. Government intervention is limited to setting official guaranteed minimum prices at which the appropriate commodity board would act as a buyer of last resort. Although marketing boards for export crops emerged in the 1940s, government involvement in setting guaranteed minimum prices for food crops did not begin until the mid-1970s.

Traditionally, marketing boards have been used as fiscal agents in relation to producers of agricultural export crops. Farmers have been paid well below world market prices for their crops. For example, the typical Nigerian producer of groundnuts was paid a price so low that it amounted to a tax of approximately 68 percent in 1950, although the tax element was down to about 36 percent by 1965[23] and by 1982 appears to have been completely replaced by subsidy. Since then, domestic producer prices for most export crops have been higher (at the official exchange rate) than the corresponding international prices. On the average, the ratio of domestic prices to international prices has been about 1.97.

Guaranteed minimum prices are established for the following scheduled food crops: beans, maize, millet, rice, guinea corn, and wheat.[24] Most nontraded food crops are excluded from this scheme. The guaranteed minimum prices serve as a below-market safety net rather than as a floor. They are also often set at fixed levels for several years at a time. The result is that, in all cases, the farm-gate price has been higher than the corresponding guaranteed minimum price. Table 2 shows that for almost all crops, the guaranteed minimum price is less than 50 percent of the retail price. It is a higher proportion of the farm-gate price, but even then, it comes close only in the case of rice (about 92 percent). It is not surprising, therefore, that because the farmer is free to sell on the open market, the commodity boards purchase very little of these commodities.

An examination of the evolution of prices within agriculture and between agriculture and the overall economy for the 1950s, the 1960s, and the period since 1970 illustrates the impact of policy changes and other exogenous factors on inter- and intrasectoral price movements. Table 3 reveals that during the 1950s, agricultural prices moved more or less in line with the consumer price index (CPI). The implicit deflators for agriculture and the CPI were

[22] See Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years).

[23] See Ogunfowora, "Conceptualizing Increased Resource Demand and Product Supply Inducing Policies in Peasant Agriculture," *Nigerian Journal of Economic and Social Studies* (March 1973): 191-201.

[24] P. Armington, "A Theory of Demand for Products Distinguished by Place of Production," *IMF Staff Papers* 16 (March 1969).

## Table 2—Relative domestic food crop prices, 1982

| Crop | Guaranteed Minimum Price | Retail Price | Farm-Gate Price | Minimum Price as a Share of Retail Price | Minimum Price as a Share of Farm-Gate Price |
|---|---|---|---|---|---|
| | | (naira/ton) | | (percent) | |
| Beans | 362 | 1,032 | 810 | 35.1 | 44.7 |
| Maize | 210 | 592 | 680 | 35.5 | 30.9 |
| Millet | 231 | 563 | 330 | 41.0 | 70.0 |
| Rice | 596 | 1,071 | 650 | 55.6 | 91.7 |
| Guinea corn | 220 | 532 | 340 | 41.4 | 64.7 |
| Wheat | 280 | 729 | n.a. | 38.4 | n.a. |

Source: Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: Central Bank, 1983).
Note: n.a. means not available.

quite close. Intrasectoral prices also showed few significant differences. Thus, the implicit deflators for domestic food crops and export crops were close and moved with the CPI.

Unlike the 1950s, significant differences in relative prices began to emerge during the 1960s (Table 4). The CPI for food only moved with the overall CPI so that the relative food price index was more or less constant. CPI for food represents the retail prices of food products and reflects the price paid by the consumer rather than that received by farmers. The more appropriate price for farmers is the farm-gate price deflated by CPI, which is captured by the relative food crops price. A comparison of the CPI for food and the relative food crops price shows that they largely move together, and hence the prices received by the farmer did not exhibit a significant upward trend relative to the general level of prices, as reflected by either the CPI or the CPI for food. On the other hand, the relative price index for export crops (the index of export prices deflated by CPI) decreased relative to the overall CPI during the 1960s.

Agricultural prices diverged even further between 1970 and 1982 (Table 4). The food component of CPI rose much faster than the overall CPI and was about 18 percent higher by year than the overall index. Thus

## Table 3—Relative prices of agricultural output, 1950-57

| Year | Implicit Deflator for Agriculture[a] | Implicit Deflator for Domestic Food Crops[a] | Implicit Deflator for Export Crops[a] | Consumer Price Index[b] |
|---|---|---|---|---|
| 1950 | 71.5 | 70.7 | 75.5 | 75.0 |
| 1951 | 80.6 | 70.9 | 104.7 | 79.2 |
| 1952 | 76.9 | 68.7 | 102.5 | 77.1 |
| 1953 | 81.7 | 76.5 | 101.4 | 80.9 |
| 1954 | 90.5 | 86.3 | 107.6 | 86.9 |
| 1955 | 93.5 | 91.3 | 104.6 | 92.3 |
| 1956 | 98.0 | 97.7 | 99.1 | 99.2 |
| 1957 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Francis Teal, "The Supply of Agricultural Output in Nigeria," *Journal of Development Studies* (January 1983): 191-206.
[a] Sectoral implicit deflators are components of the aggregate implicit GDP deflator.
[b] A wholesale price index is not available.

## Table 4—Relative prices of agricultural crops, 1960-69 and 1970-82

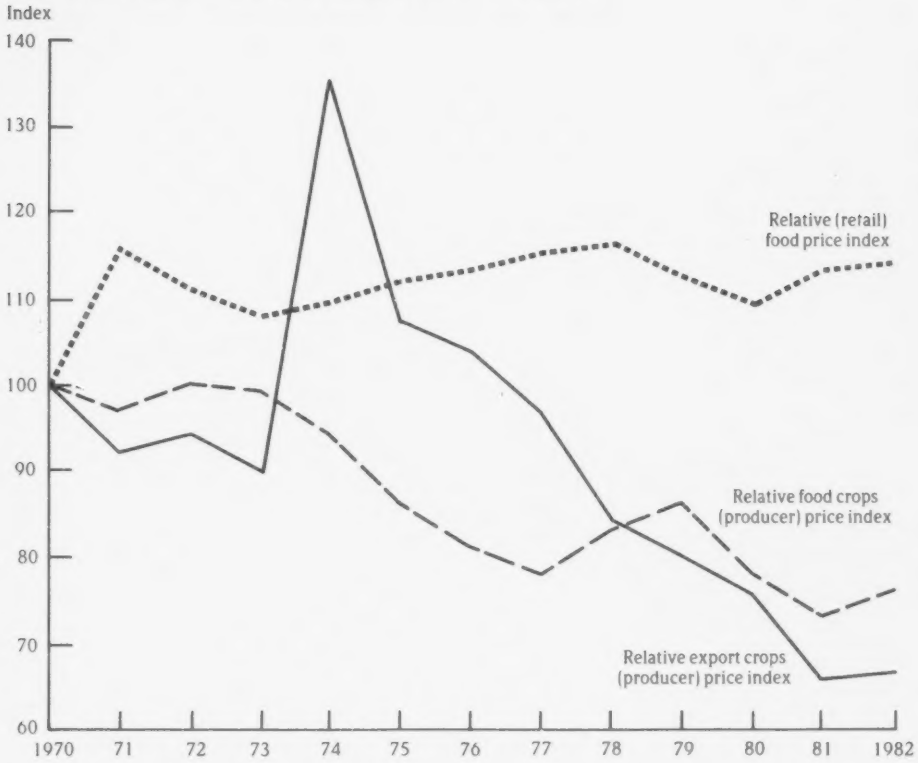
| Period/ Year | Consumer Price Index | Consumer Price Index (Food) | Export Crops Price | Relative Export Crops Price | Food Crops Price | Relative Food Crops Price |
|---|---|---|---|---|---|---|
| | | | | (1960 = 100) | | |
| 1960-69 | | | | | | |
| 1960 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1961 | 100 | 110 | 95 | 89 | 108 | 102 |
| 1962 | 112 | 118 | 84 | 75 | 119 | 106 |
| 1963 | 109 | 108 | 83 | 76 | 114 | 105 |
| 1964 | 110 | 106 | 86 | 78 | 114 | 104 |
| 1965 | 114 | 111 | 90 | 78 | 113 | 99 |
| 1966 | 126 | 133 | 79 | 63 | 151 | 120 |
| 1967 | 121 | 119 | 83 | 69 | 143 | 118 |
| 1968 | 120 | 113 | 82 | 68 | 128 | 106 |
| 1969 | 132 | 134 | 77 | 58 | 136 | 102 |
| | | | | (1970 = 100) | | |
| 1970-82 | | | | | | |
| 1970 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1971 | 111 | 129 | 107 | 92 | 112 | 97 |
| 1972 | 119 | 132 | 112 | 94 | 119 | 100 |
| 1973 | 127 | 137 | 114 | 90 | 126 | 99 |
| 1974 | 144 | 157 | 194 | 135 | 135 | 94 |
| 1975 | 161 | 181 | 174 | 108 | 139 | 86 |
| 1976 | 198 | 223 | 205 | 104 | 161 | 81 |
| 1977 | 231 | 265 | 223 | 97 | 181 | 78 |
| 1978 | 269 | 312 | 225 | 84 | 222 | 83 |
| 1979 | 300 | 337 | 241 | 80 | 257 | 86 |
| 1980 | 331 | 362 | 251 | 76 | 259 | 78 |
| 1981 | 400 | 453 | 265 | 66 | 291 | 73 |
| 1982 | 431 | 493 | 290 | 67 | 327 | 76 |

Sources: Francis Teal, "The Supply of Agricultural Output in Nigeria," *Journal of Development Studies* (January 1983); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

Notes: Relative prices are deflated by the consumer price index. The food and export crops prices are producer prices, whereas the consumer price index for food represents a retail price.

the relative food price index (the retail index) trended upward, but the prices received by the farmer declined relative to the overall CPI throughout 1970-82. The relative export price index (the producer price index) declined relative to the CPI between 1970 and 1973, increased between 1974 and 1976, and declined again between 1977 and 1982. These divergent movements in relative agricultural prices raise a number of issues for policy analysis (see Figure 3).

**Figure 3—Food and export crop prices, 1970-82**




Sources: Francis Teal, "The Supply of Agricultural Output in Nigeria," *Journal of Development Studies* (January 1983); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

Note: Relative prices are deflated by the consumer price index.

# 4

# SURVEY OF ECONOMIC POLICIES

Nigeria has experimented with a wide variety of economic policies since the late 1950s. The policy environment during the 1960s, which supported an import-substitution-industrialization strategy of economic development, gave birth to an inward-looking trade regime in which high tariff walls protected local manufacturing.[25] More recent developments in the economy, particularly since the mid-1970s, have caused basic policy goals to be redefined, especially for agriculture.

## The Policy Setting

The primary focus of Nigeria's economic policies has, traditionally, been the protection of local industries, modified at times by concerns for balance-of-payments problems.[26] More recently, however, the oil boom and its consequences have directed increased policy attention toward the need to provide growth incentives for agriculture.

As a capital-deficit, oil-exporting country committed to rapid economic development, the overriding focus of general economic policy in Nigeria, as stated in National Development Plan Documents, is how to utilize its short-term oil revenue windfall to effect a transition to a diversified, broad-based economy in the longer term. The need to diversify and restructure the national economy toward self-sustaining growth and development has direct policy implications for agriculture. It requires the economy to move away from the dominance of the oil sector toward expansion of domestic production, especially in agriculture. One of the major long-run goals of general economic policy in Nigeria is to maintain a viable agricultural sector during and after the oil era. Agricultural policies to achieve this goal can be assumed to include: achievement of self-sufficiency in the domestic production of food; revival of agricultural export crops production; generation of rural and agricultural employment; and improvement of rural income and welfare.

The food security goal has its roots in the balance-of-payments problem, which has become intractable since 1976. Thus in the short run there is policy emphasis on the need to reduce imports of agricultural commodities (mostly food), but the real long-run policy concern appears to be the need to ensure a favorable balance-of-payments position in the agricultural sector. Achievement of this objective would return the country to a situation similar to that before the oil boom, when net foreign exchange earnings from agriculture formed the basis of general development strategy, especially industrialization.

The production unit appropriate to this strategy should be the main focus of agricultural policy. The smallholder farming unit accounts for more than 90 percent of domestic food and export crops production.[27] In spite of recent official flirtation with large-scale farming and agricultural mechanization, it seems clear that significant expansions in agricultural output will have to come from the small-scale farmer.[28] Im-

[25] This was a fairly common development strategy in developing countries as shown by such studies as Bela Balassa, *The Structure of Protection in Developing Countries* (Baltimore: Johns Hopkins University Press, 1971).

[26] Policy evolution in Nigeria is extensively discussed in P. Kilby, *Industrialization in an Open Economy: Nigeria 1945-1966* (Cambridge, England: Cambridge University Press, 1969); and T. Ademola Oyejide, *Tariff Policy and Industrialization in Nigeria* (Ibadan, Nigeria: Ibadan University Press, 1975).

[27] See Food and Agriculture Organization of the United Nations, *Agricultural Development in Nigeria*.

[28] See World Bank, "Large Scale Farming and Mechanisation," *Nigerian Agricultural Sector Review* (Washington, D.C.: World Bank, 1979).

provement of his productivity and production environment should therefore be the target of agricultural policy.

## Types of Agricultural Policies

Agricultural policies to improve agriculture's performance can be conveniently grouped as follows: those aimed at altering the basic structure of farmers' production environment; those relating to the size and price of food imports, as well as the pricing of agricultural export crops; and those concerning sources of intermediate agricultural inputs, whether imported or domestically produced. (The latter two are discussed in the section on trade policy.)

Agricultural policies in the first group include research and development of improved seeds and technology, the provision of extension services, and rural infrastructural development. Although these are long-standing policy measures, their focus has changed since the mid-1970s. Up to that time, most of the agricultural research institutes focused on export crops, in accordance with government's preoccupation with cash crop expansion. Little or no attention was paid to improving seeds and production technologies of food crops.[29] In recent times, however, additional research facilities have been established to examine the specific problems of food crops such as grains and root crops.[30]

The existing network of extension services, which was quite active during the 1960s in dealing with the spread and expansion of export crops, was beginning to wither away with the emergence of oil exports (and hence less reliance on agricultural export crops) in the early 1970s. Under the agricultural development projects and area schemes, jointly financed by the Nigerian government and the World Bank, extension services are being revived, along with the provision of rural infrastructure and improved rural marketing systems.[31]

Another major policy aimed at altering the farmers' production environment is subsidized agricultural credit. Recognizing that the Nigerian land tenure system and high rate of illiteracy among smallholder farmers hinder their access to credit from the banking system, the government has adopted two measures to remove this bottleneck. First, bank loans for agricultural projects were provided at concessionary interest rates of 6-8 percent during the last five years compared to rates of 12-14 percent for most other economic activities.[32] Second, agricultural loans are insured by the government under the Agricultural Credit Guarantee Scheme to assist smallholder farmers who are unable to provide acceptable collateral for bank loans.

In addition, a special financial institution—the Nigerian Agricultural and Cooperative Bank—is funded by the government to provide agricultural credit to individual farmers and farmers' cooperatives.

## Trade Policy

Nigerian trade policy continues to influence intersectoral terms of trade between agriculture and other sectors of the economy, particularly on issues such as the size and prices of agricultural imports, the prices of agricultural export crops, and the size and prices of imports of intermediate agricultural inputs and agricultural capital equipment. Its direct effects on the prices of agricultural inputs and outputs make trade policy a powerful instrument for bringing about desired

[29] See Consortium for the Study of Nigerian Rural Development, *Strategies and Recommendation.*

[30] For a list of such facilities and a discussion of their functions, see Francis S. Idachaba, et al., *The Green Revolution: A Food Production Plan for Nigeria* (Lagos: Federal Ministry of Agriculture, May 1980).

[31] Agricultural Projects Monitoring, Evaluation, and Planning Unit, *Project Completion Reports* (Kaduna, Nigeria: Federal Department of Rural Development, 1982).

[32] Monetary policy circulars issued annually contain information on the government regulated interest rate structure. They are reproduced and discussed in various issues of Central Bank of Nigeria, *Annual Report and Statement of Accounts.*

changes in the agricultural sector. Until recently, however, trade policy's impact on agriculture did not receive much attention. Its use was dictated largely by overall balance-of-payments considerations.

The main trade policy instruments in Nigeria are import tariffs, export duties, and quantitative restrictions on imports and exports. Quantitative restrictions occur either in the form of import and export bans placed on particular commodities, or specific licenses required for the import or export of given commodities. During periods of extreme pressure on foreign reserves, importation of a wide range of commodities is often banned entirely, while a large number of other commodities may be restricted through the use of specific import licenses. Thus, between 1982 and 1983, almost 200 commodities were placed on the list of commodities subject to specific import licenses, and the exportation of many food crops was banned.

Export duties, ranging between 5 and 60 percent, were applied to agricultural export crops such as cocoa, rubber, cotton, palm oil, palm kernel, and groundnuts throughout the 1960s and the early 1970s. When large amounts of revenue became available to the government from the oil sector, however, the need to rely heavily on revenue from agricultural export taxes ceased. This also coincided with the recognition that agricultural export crops needed to be revived. Hence, there have been no export duties on agricultural crops since the mid-1970s. Until the 1970s, in addition to explicit export taxes, agricultural exports were also subjected to implicit taxation through the marketing and pricing system of the commodity marketing board. As in many other developing countries, the marketing boards in Nigeria had monopoly powers over the exports of agricultural crops and used these powers to tax producers of export crops by paying them well below world market prices.[33]

On the import side, trade policy in Nigeria has traditionally protected local manufacturing industries by imposing relatively high import duties on finished products and very low or no import duties on industrial raw materials and intermediate capital inputs. This system has gradually been extended to cover the agricultural sector. Import duties on food commodities such as maize, rice, wheat, and sorghum were raised to between 50 and 100 percent between 1978 and 1982, and agricultural inputs have been provided at subsidized rates.

The result is that most imported agricultural commodities are not only subject to high import tariffs, but also to fairly stringent quantitative restrictions. For many agricultural commodities, these restrictions influence domestic prices more than tariffs because large quantities of food imported by state and federal governments enter the country duty-free. Guaranteed minimum prices have been established for many of the domestically produced food crops, including beans, maize, millet, rice (paddy and milled), guinea corn, and wheat. However, this scheme has had little or no effect since these prices are kept constant for several years at levels far below the prevailing market prices.[34]

Trade policy on the import of raw materials for inputs and capital equipment for local manufacturing activities is generous. Tariff rates for such goods range from 0 to 15 percent. Trade policy for agricultural inputs and capital equipment has become even more generous during the last seven years. An extensive program of subsidies for intermediate agricultural inputs covers fertilizer, improved seed varieties, herbicides, insecticides, fungicides, and other chemical inputs. It also provides subsidies for capital equipment, particularly tractors.

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[33] See Consortium for the Study of Nigerian Rural Development, *Strategies and Recommendations*.

[34] The guaranteed minimum price (GMP) was kept constant for several years because of the possible inflationary pressure that could arise from a high GMP (Central Bank of Nigeria, *Annual Report and Statement of Accounts*, p. 16).

The subsidy rates are substantial, ranging from 50 percent for tractors to 85 percent for fertilizer. Of all the subsidized inputs, fertilizer appears to have had the greatest response from farmers, as indicated by increasing use. It also appears that at low subsidized prices, an excess demand for fertilizer exists. This has encouraged the emergence of a secondary market in which fertilizer is sold at a higher price. Thus, the farmers' subsidy is probably lower than the official rate. Imports of other agricultural inputs are also subject to quantitative restrictions. This means that farmers' demand for these imports cannot always be satisfied at the official subsidy rate.

Although trade policy has had a substantial influence on both the input and output prices of agricultural commodities, it has not been consistently applied. On several occasions during the last seven years, policy measures were adopted to limit the size of agricultural imports and raise tariffs on imported agricultural commodities in response to balance-of-payments problems. Such fluctuations give confusing signals to producers of agricultural commodities.

Nigerian trade policy also may be biased in favor of traded agricultural commodities. Import restrictions directly affect the output prices of traded commodities as well as prices of agricultural inputs, which may be used to produce both traded and nontraded commodities. However, the direct effect of trade policy on the prices of inputs and outputs of traded commodities is likely to be greater than on nontraded commodities. The impact of trade policy on the prices of the latter is likely to be largely indirect and will depend on whether these nontraded commodities can be substituted for traded ones. Thus, whereas the domestic price of wheat may be directly influenced by the import policy on wheat, the domestic prices of sorghum and millet will probably be influenced by the import price of wheat, which can be used as a substitute.

## Exchange Rate Policy

Changes in exchange rate policy have significant consequences for a country's domestic relative prices and economic growth through their effects on the real exchange rate. The real rate is a measure of the terms of trade between the traded and nontraded sectors of the economy, which provides the signal for resource movements. However, governments do not control the real rate directly; their instrument of control is the nominal rate. An exchange rate policy focused on maintaining a target real exchange rate would use nominal exchange rate changes as well as complementary monetary and fiscal policy measures.

Exchange rate policy affects domestic prices of traded and nontraded agricultural commodities through its influence on the entire domestic cost structure. Overvaluation of exchange rates by domestic policies or other factors appears to be a common feature of most developing countries, where it serves as an impediment to producers of agricultural export crops and an implicit subsidy for imports of agricultural and nonagricultural goods and services. An additional problem for a capital-deficit, oil-exporting country like Nigeria is that the high rates of capital inflows that normally accompany an oil boom tend to drive the real exchange rate down. In other words, rapid capital inflows tend to cause the currency to appreciate. A policy that keeps the real exchange rate low impedes growth of the tradable goods sector, particularly agriculture. This explains why some countries with an oil boom have adopted policies to prevent the tradable/nontradable price ratio from continuing to fall as the oil boom proceeds.[35] Exchange rate protection increases the prices of traded goods relative to the prices of nontraded goods and thus enhances relative profitability of the traded goods sector.

In Nigeria, the exchange rate policy appears to have been focused on maintaining

[35] A good example is the case of Indonesia, which is analyzed in P.G. Warr, "Exchange Rate Protection in Indonesia," *Bulletin of Indonesian Economic Studies* 20 (August 1984): 52-89.

a relatively constant nominal rate. However, between 1974 and 1978, the period of massive capital inflows associated with the oil boom, the Central Bank adopted the strategy of gradual nominal appreciation of the naira against the U. S. dollar and the British pound sterling with the primary aim of producing naira exchange rates that would adequately reflect the country's balance-of-payments position.[36] This policy was clearly the opposite of exchange rate protection. It strengthened the tendency of capital inflows to appreciate the real exchange rate. It is not surprising, therefore, that between 1970 and 1980 the nominal rate appreciated by 22.5 percent and the real rate by 55.1 percent.[37] In fact, between 1973 and 1980, when oil-related capital inflows were particularly significant, the real exchange rate appreciated by 61 percent, compared to 17 percent for the nominal rate.

Nigeria's exchange rate policy has had a significant impact on the development of agriculture, particularly since the early 1970s when the naira became substantially overvalued. Both overvaluation and periodic variations in the real exchange rate have substantially reduced production incentives for the nonoil tradable sectors of the economy, particularly agriculture.

## Policy Mechanisms

In addition to import tariffs, export duties, and domestic marketing distortion, trade and exchange rate policies have been implemented by import and export bans and licensing and exchange control regulations. For instance, exchange control regulations and import restrictions have been relied upon as the primary instruments for carrying out balance-of-payments adjustments. Thus, Nigeria's overvalued exchange rate has been sustained by limiting imports to the amount of foreign exchange earned by exporting at the disequilibrium exchange rate. Exchange and import controls are relied on because they exert prompt, direct, and predictable effects on the value of imports and can be used to discriminate between "essential" and "nonessential" imports. However, this system suppresses rather than solves the basic underlying problem, works through a costly and complex administrative structure, and encourages the corruption of government officials whose powers and privileges are derived from the exercise of discretion in granting licenses and approvals.[38] A glaring example of the negative effects of quantitative import restrictions is provided by the movement of domestic rice prices in recent years. They have varied as much as 300 percent within a year largely in response to variations in the issuance of import licenses. Although this may be an extreme case, short-term variations in quantitative restrictions have introduced substantial price instability for several agricultural commodities. This has reduced the apparent value of incentives provided by the trade regime. One way of establishing a more reliable and less erratic pattern of trade and exchange rate policies would be to rely less on quantitative restrictions and exchange control. Trade and exchange rate policies can be expected to provide better signals for resource movements in the economy if they depend more on the market mechanism for their effectiveness than on bureaucratic discretion.

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[36] See Central Bank of Nigeria, "Note on the Determination of Exchange Rate," internal memo, October 1975.

[37] Analytical attention for determining the exchange rate was on the oil sector, which masked the sustained deficit in the basic nonoil balance-of-payments position. As a result, the implications of real exchange rate appreciation for the nonoil tradables were not explicitly determined. See T. Ademola Oyejide, "Exchange Rate Policy for Nigeria: Some Options and Their Consequences," paper presented at the Workshop on Management of Nigeria's Foreign Exchange Resources, University of Ibadan, March 15, 1985.

[38] See Jagdish Bhagwati, *Anatomy and Consequences of Exchange Control Regimes* (Cambridge: Balinger, for the National Bureau of Economic Research, 1978).

# 5

# AGRICULTURAL PRICE INTERVENTIONS AND INCENTIVES

Government interventions in agriculture are intended to directly or indirectly influence production, factor use, income, and prices. Sometimes, the effect on prices is meant to benefit the producer, at other times the consumer or government. Thus, a cheap food policy is one way of subsidizing urban consumers, whereas a commodity marketing board, which fixes producer prices for export crops below corresponding world market prices, does so to boost government revenue. Of course, a guaranteed minimum price for a commodity can be fixed above the corresponding domestic and world market prices as a means of subsidizing domestic producers. It is clear therefore that government intervention in agricultural prices can have either incentive or disincentive effects on production.

Direct government intervention can, in general, be classified into two broad categories. One type operates in the external sector of the economy and is implemented through either agricultural import or export controls. Import controls include tariffs and quantitative restrictions such as quotas, licensing, and bans. Similarly, exportation of agricultural crops can be controlled through taxes and subsidies as well as through quantitative restrictions, such as export quotas, licensing, or the banning of particular crops. The second type of government intervention works chiefly through domestic agricultural output and input markets. In the agricultural product market, government may provide output price support for particular crops or may administratively fix product prices and thus remove the influence of conventional market forces. In the same way, agricultural inputs may be fixed administratively so as to subsidize users. Both categories of government intervention in agricultural prices are widely used in Nigeria.

## Intervention and Competitiveness

Domestic prices of Nigeria's agricultural crops have been compared with the corresponding international prices to indicate the approximate extent to which domestic agricultural production is shielded from external competition. For importables, farm-gate price has been compared with the Nigerian c.i.f. import price plus port and transport charges to the consumption center. For the exportable commodities, the comparison is between the Nigerian f.o.b. price and the farm-gate price plus the appropriate transport and port handling charges. This exercise is beset with inherent problems. The comparisons are rough because no adjustments have been made for quality differences among commodities. In addition, world price equivalents have been translated into domestic currency using the official exchange rate. This procedure does not take account of the substantial overvaluation of the naira, particularly since the mid-1970s. This implies that world price expressed in domestic currency has been underestimated in relation to the degree of overvaluation. Hence, any implicit tax on exports has been underestimated, whereas protection to imports has been overestimated. It is important to bear these deficiencies in mind when interpreting the price comparisons.

The ratios of domestic prices to international prices for selected agricultural crops in Nigeria for 1979-82 are presented in Table 5. The comparison can be made only for internationally traded commodities. Hence, crops such as yams, cassava, millet, and cowpeas, which are not internationally traded, have had to be excluded even though they are important components of the Nigerian food basket. Groundnuts and palm

**Table 5—Ratios of domestic prices to international prices for selected agricultural crops, 1979-82**

| Commodity | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| Food crops | | | | |
| Maize | 1.13 | 1.35 | 1.99 | 2.40 |
| Rice (paddy) | 0.75 | 0.72 | 0.85 | 1.19 |
| Sorghum | 1.29 | 1.17 | 1.85 | 1.87 |
| Food export crops | | | | |
| Groundnuts | 0.97 | 0.88 | 1.15 | 1.47 |
| Palm oil | 0.88 | 0.82 | 0.98 | 1.60 |
| Export crops | | | | |
| Cocoa | 0.63 | 0.94 | 1.45 | 1.40 |
| Rubber | 1.00 | 0.79 | 1.31 | 1.18 |
| Cotton | 0.56 | 0.62 | 0.65 | 0.86 |
| Palm kernel | 1.03 | 1.00 | 1.31 | 1.78 |

Source: Derived from data in James W. Robertson, "An Analysis of Agricultural Trade and Subsidy Policies in Nigeria," Country Policy Department, World Bank, Washington, D.C., August 1983 (mimeographed).

Note: Domestic and international prices are made comparable by transforming international prices into their domestic currency equivalents, using the official exchange rate.

oil were important export crops during the 1960s, but are now largely used as food. However, if current policy to revive all exportables succeeds, they may again become important export crops.

An implicit tax or negative protection is implied in Table 5 whenever domestic price is below the external price and hence the ratio is less than unity. A ratio of domestic to international price that exceeds unity implies positive protection for domestic production of the crop. The table shows a mixed pattern of protection. Whereas it is obvious that the general level of protection has increased for the three groups of crops, it is not so clear that government's price intervention policies have made any distinction among the groups. Thus by 1982 rice and rubber appear to be equally protected. The same applies to sorghum and palm kernel. Maize stands out with an unusually high 140 percent protection rate.

Until 1980, the results indicate that export crops (except palm kernel) were implicitly taxed. The rate was particularly high for cotton; it is also the only export crop in this sample that remained implicitly taxed through 1982, though the rate declined from 1979. By 1982, all other export crops were protected as a result of administrative price interventions.

Groundnuts and palm oil were generally subject to varying degrees of implicit taxation through 1981, after which they received substantial protection. Among the food crops, only paddy rice was implicitly taxed between 1979 and 1981. Maize and sorghum enjoyed import protection throughout 1979-82.

The general pattern indicates that, from 1979 onward, government's agricultural price interventions have differed from the standard developing-country price posture, characterized by an implicit tax on export agriculture in general and implicit protection on import-competing agriculture (usually food crops). However, a note of caution should be entered here. As previously indicated, the estimated ratios in Table 5 were computed using the official naira exchange rate. Given the high rate of overvaluation of Nigerian currency since the early 1970s, the import protection rates are probably not really as high as those in the table. By the same token, the estimates of implicit taxation are probably higher.

Year-to-year variations in the level of exchange rate overvaluation and foreign price changes make it difficult to determine the exact degree of over- and underestimation in the implicit protection and tax rates. What seems clear, however, is that the general effect of the government's price intervention policies has been to raise the domestic prices of most of Nigeria's agricultural crops above their corresponding world prices so that varying degrees of import protection are provided for domestic production.

## Intervention and Effective Protection

The combined effects of price intervention policies on the relative incentives to the major activities in the agricultural sector can also be assessed by comparing estimates of nominal and effective rates of protection

for different crops.[39] The nominal rate measures the extent to which domestic prices diverge from world parity prices. It should, in principle, reflect a pattern similar to that revealed in Table 5 since the price variables being compared are essentially the same.

A clear upward trend in nominal rates of protection for all crops, both food and nonfood, is revealed in Table 6. It also shows that while most of the exportable crops (groundnuts, cocoa, and rubber) had negative nominal rates of protection in the earlier years, all had substantial nominal protection in 1981 and 1982. This confirms the pattern, shown in Table 5, that all crops were receiving protection from external competition by 1982.

A limitation of the nominal rate of protection is that although it measures the effects of price intervention for a sector's output prices, it ignores the input side. As a result, nominal rates of protection are not adequate measures of the effects of price interventions on both output and input markets. A more appropriate indicator is the effective rate of protection, which reflects subsidy to value added. Although it is a better measure of the amount of incentive to the domestic producer of a commodity, it does not take account of exchange rate overvaluation.

Estimates of effective rates of protection exhibit a clear upward trend (Table 7), in spite of wide variations for particular crops and over time. For exportable crops, this means that rates of effective protection or implicit taxation switched from negative in the 1960s and 1970s to positive in more recent times. It confirms the conventional developing-country pattern of positive and relatively high effective protection rates. Although the effective protection rates for maize, sorghum, and cocoa were particularly high in 1981 and 1982, it should also be noted that levels of protection for manufacturing and processing activities have been high and widely dispersed since the early 1960s when Nigeria adopted the import-substitution-industrialization strategy. On average, effective rates of protection for consumer goods range between 80 and 150 percent and those for intermediate and capital goods between 25 and 75 percent. Several outliners—goods under import license or otherwise subject to some form of quantitative import restriction—have effective protection rates of more than 200 percent. In spite of recent increases in their rates of protection, agricultural crops generally are relatively less protected than products of the manufacturing sector. Within the agricultural sector itself, export crops receive less protection than food crops.

**Table 6—Nominal rates of protection for selected agricultural crops, 1979-82**

| Commodity | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| | | (percent) | | |
| Maize | 61.2 | 94.8 | 188.3 | 245.4 |
| Rice (paddy) | 1.1 | −4.4 | 13.2 | 59.0 |
| Sorghum | 84.9 | 66.9 | 137.9 | 195.2 |
| Groundnuts | −0.9 | −10.5 | 17.5 | n.a. |
| Cocoa | −37.6 | −7.7 | 32.8 | 26.0 |
| Rubber | −49.3 | −46.5 | −2.1 | 14.2 |
| Palm kernel | 3.4 | 0.0 | 31.2 | n.a. |

Source: James W. Robertson, "An Analysis of Agricultural Trade and Subsidy Policies in Nigeria," Country Policy Department, World Bank, Washington, D.C., August 1983 (mimeographed).
Note: n.a. means not available.

## Implications of Price Intervention

The above estimates clearly indicate that agricultural price interventions in Nigeria have increasingly protected domestic production of agricultural crops from external competition. For most of 1960-82, how-

[39] The concepts of nominal and effective protection, as well as their uses and limitations, are extensively discussed in Balassa, *Structure of Protection in Developing Countries;* and William M. Corden, *The Theory of Protection* (Oxford: Clarendon Press, 1971).

**Table 7—Effective rates of protection, selected agricultural crops, selected years, 1960-82**

| Commodity | 1960-65 | 1965-70 | 1970-76 | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|---|---|
| | | | | (percent) | | | |
| Maize | -3 | 14 | 13 | 61 | 95 | 189 | 247 |
| Rice | -20 | 23 | 35 | 1 | -4 | 13 | 59 |
| Sorghum | -3 | 14 | 13 | 86 | 67 | 190 | 197 |
| Millet | -3 | 14 | 13 | 8 | 9 | 5 | 3 |
| Yams | n.a. | n.a. | n.a. | 1 | 1 | 1 | 0 |
| Cassava | n.a. | n.a. | n.a. | 1 | 1 | 0 | 1 |
| Cowpeas | n.a. | n.a. | n.a. | 4 | 4 | 2 | 2 |
| Groundnuts | -40 | -47 | -53 | -1 | -11 | 18 | n.a. |
| Palm oil | -56 | -50 | -29 | n.a. | n.a. | n.a. | n.a. |
| Cocoa | -48 | -60 | -42 | -31 | 22 | 138 | 114 |
| Rubber | n.a. | n.a. | n.a. | -1 | -23 | 34 | n.a. |
| Cotton | -44 | -42 | -43 | -21 | -16 | 18 | 20 |

Sources: Data for the years 1960-76 are taken from Tshikala Tshibaka, "Effects of Nigerian Trade Policies on the Agricultural Sector, 1955/56-1975/76," Ph.D. thesis, University of Ibadan, 1979, p. 102. Data for the years 1979-82 are taken from James W. Robertson, "An Analysis of Agricultural Trade and Subsidy Policies in Nigeria," Country Policy Department, World Bank, Washington, D.C., August 1983 (mimeographed), p. 24.

Notes: n.a. means not available. Effective rates of protection are computed taking into account purchased inputs subject to import duties and sales taxes.

ever, this simply means that the rate of implicit taxation of agricultural export crops was decreasing. Export crops did not receive positive encouragement through protection until the 1980s. It can therefore be concluded that until fairly recently exportable crops able to compete successfully in the international market have been taxed, whereas import-competing crops—usually food—have received substantial protection, at least since the mid-1960s.

The treatment of agricultural export crops appears consistent with Nigeria's general development strategy and policy objectives before the oil boom of the mid-1970s. In most developing countries since the late 1950s export crop marketing boards have been used more as government revenue-gathering agencies than as a means of enhancing domestic production or protecting farmers' income. This was particularly true in Nigeria during the 1960s. But as government received more revenue from the oil sector from 1974 onward, the need to finance government services by squeezing the agricultural sector abated. At the same time, the critical importance of agriculture to economic development began to be more widely recognized. This was spurred, no doubt, by rising food import volumes and falling agricultural export earnings.

It is doubtful whether the substantial protection of food crops since the mid-1960s has occurred as a result of policy choice or as a by-product of other macroeconomic considerations. Quantitative import restrictions have been the most significant influence on nominal protection, especially for food crops. Guaranteed minimum prices have had no discernible effect on domestic prices because they have generally been much lower than prevailing market prices. Input subsidies, although substantial, have not had much impact on the large majority of Nigeria's farmers, who continue to rely primarily on traditional production techniques.

Quantitative import restrictions on food crops tend to be used largely for dealing with short-term balance-of-payments adjustment problems. It is usual to have a long list of commodities placed under specific import license requirements or complete ban whenever Nigeria's foreign reserve is under pressure. When this happens, it is reflected in large positive rates of protection

for the commodities concerned. Because of the way they are used, quantitative import restrictions unfortunately involve short-term fluctuations in size and sometimes direction of production incentives. The result is that protection for food crops often does not indicate stability and consistency in policy intentions. Hence, apparently large production incentives do not necessarily result in positive and sustained supply response.

# 6

# AGRICULTURE AND THE DUTCH DISEASE

The rapid expansion of the oil sector since the early 1970s has led to sectoral changes and reallocation of factors of production among different economic activities. A resource boom of this nature influences the sectoral structure of the economy largely through changes in relative prices.[40]

Models of the Dutch Disease phenomenon have been analyzed to identify basic hypotheses relating to the effects of a resource boom, particularly on the relative size of sectors, sectoral prices, the wage rate, and the real exchange rate. These hypotheses have been examined in the light of the structural changes in the Nigerian economy between 1979 and 1982 to determine the effects of the oil boom on output and prices of agricultural export crops and import-competing food crops.

## Effects of a Resource Boom

The rapid expansion of the resource sector in a resource-exporting country affects the overall economy through a network of interactions. The resource sector uses factors, particularly labor and capital, which, if not brought in from abroad, must be withdrawn from other sectors of the economy. Expansion of the resource sector creates additional income, which generates expenditures. The effects of these expenditures depend on the types of goods on which the increased income is spent. The resulting spending pattern affects demand and supply conditions in the product market. The sector's withdrawal of factors also impinges on the economy's factor markets. Thus expansion of the resource affects not only relative product prices but also factor prices and the exchange rate. The effect on the exchange rate occurs because exports of the expanding resource generate an inflow of capital, the spending of which affects the real exchange rate. Over the long run, a booming resource sector leads to changes in the sectoral structure of the overall economy.

Several models have been developed to capture, in a more formal sense, the basic ideas and hypotheses sketched above. A typical model of this type is based on the standard assumptions of a small, open economy producing three kinds of goods: importables, exportables, and nontradables. The world prices of the importables and exportables are exogenously given, whereas the prices of (nontraded) domestic goods are determined by domestic demand and supply factors. One of the two traded goods sectors is taken as the resource sector, and the other represents traditional food and agricultural products, as well as import-competing manufacturing products.

In general, a booming resource sector influences the rest of the economy through the spending and resource-movement mechanisms. Each is a distinct channel for the effects and can be shown separately using simple versions of the basic Dutch Disease model.

### The Spending Mechanism

The spending mechanism is best illustrated by a model that treats the resource

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[40] This section relies heavily on the growing body of literature on the "Dutch Disease" phenomenon, which takes its name from the effects of a boom in natural gas on the economy of the Netherlands. Contributions to the literature include: R. G. Gregory, "Some Implications of the Growth of the Mineral Sector," *Australian Journal of Agricultural Economics* 20 (1976): 71-91; William M. Corden and P. Neary, "Booming Sector and De-Industrialization in a Small Open Economy," *Economic Journal* 92 (1982): 825-848; A. C. Harberger, "Dutch Disease: How Much Sickness, How Much Boom?," *Resources and Energy* 5 (No. 1, 1983); and H. Siebert, ed., *The Resource Sector in an Open Economy* (Berlin: Springer-Verlag, 1984).

sector only as an exporter having no supply-side links with the rest of the economy. As before, the rest of the economy consists of two sectors, the traded and the nontraded. The nominal sector prices are $P_R$ for the resource sector, $P_t$ for the traded sector, and $P_n$ for the nontraded goods sector. Because world prices of traded goods are exogenously determined, the ratio $P_R/P_t$ is treated as given.

The aggregate output of all traded goods sectors ($Q_T$) consists of the output of the resource sector ($Q_R$) and the remaining traded goods sector ($Q_t$):

$$Q_T = Q_t + (P_R/P_t)\, Q_R. \qquad (1)$$

The economy's total output ($Q$) is given by

$$Q = Q_T + Q_n, \qquad (2)$$

where $Q_n$ represents the output of the nontraded goods sector.

The economy's production possibility frontier is assumed to have the usual concave shape so that at least one factor (presumably labor) can move between the domestic traded and nontraded goods sectors (Figure 4). The resource boom is reflected by the movement of the transformation curve from n't' to n"t". Following this shift, the equilibrium production point moves from P to P', reflecting the existing price ratio between nontraded and traded goods ($P_n/P_t$). But, if all income is spent and nontradables are not inferior goods, the new consumption point C will be to the right and below P', given the concave shape of the transformation curve. In this situation there would be an excess demand for nontraded goods that could only be eliminated by an increase in the relative price of nontraded to traded goods ($P_n/P_t$). This relative price change would cause an increase in the output of nontraded goods and a corresponding reduction in the output of the domestic traded goods sector (a movement from T to T' in Figure 4).

In this simple version of the Dutch Disease, the resource boom reflects an increase in foreign resources received. The booming export sector does not use domestic factors of production but generates an increase in income. As this additional income is spent on both traded and nontraded goods, relative prices change. The excess demand for nontraded goods forces up the relative price in favor of nontraded goods, whereas the increased demand for traded goods is met by increased imports. The result is that the expansion of the nontraded sector is achieved at the expense of the traded sector; factors of production are diverted from the traded sector whose output also declines.

### The Resource Movement Mechanism

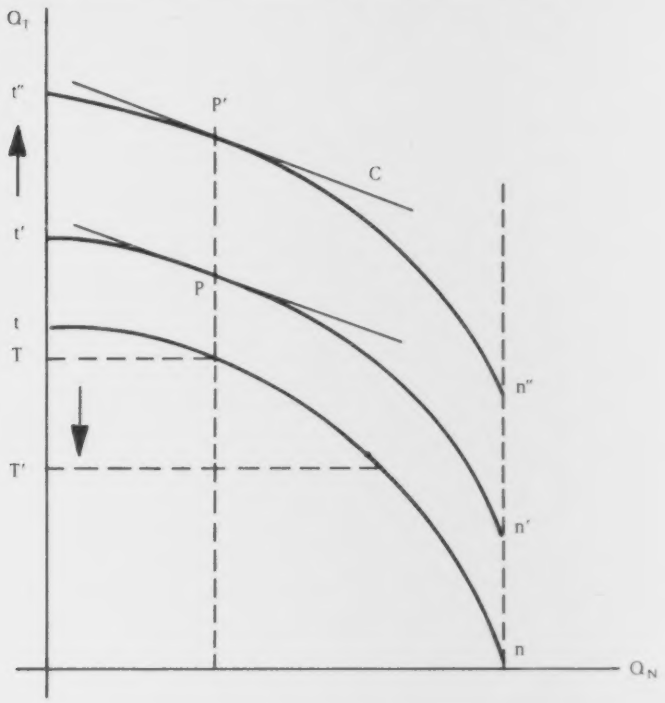
If the resource sector is not an export enclave, it can also interact with the rest of the economy on the supply side. Assuming that capital is sector-specific, this means that in the short run labor is the only mobile factor of production. The production function for each of the three sectors is characterized by diminishing marginal products. In each sector therefore, the marginal product of labor is a decreasing function of the labor input. A transformation curve, similar to that in Figure 4, can be constructed. Its slope indicates the opportunity cost of nontraded goods in terms of traded goods.

A boom in the resource sector can, through its effect on income, cause the demand curve for the nontraded goods sector to shift upward. This puts upward pressure on the $P_n/P_t$ ratio, which in turn induces a rightward shift in the supply curve of nontradable goods. Thus, both the booming resource sector and the nontradable sector demand more labor. Because the total supply of labor in the economy is fixed, the required labor is drawn from the tradable sector. The wage rate in the traditional tradable sector is forced up as labor moves to the two other sectors.

### Total Effect

The total impact of a resource boom is a combination of several effects. The magnitude of each may vary depending on the intersectoral substitution relationships in both production and consumption. For in-

**Figure 4—Spending effect of a resource boom**




stance, the movement of resources as the result of the boom causes the price received by the traditional export goods sector to fall relative to the price of domestic goods, and the domestic output of this sector is reduced. In the same way, the relative price of importables falls and the size of import-competing goods diminishes. However, the nontradables sector is not homogeneous, and some of these goods may have elasticities of substitution (in consumption) with import-competing or exportable goods that are quite high. In such cases, a resource boom may be expected to reduce the output of those nontraded goods for which imports are close substitutes, all else being equal.

In some cases, the total effect of a resource boom can be ambiguous. One example is the combined effect of spending and the resource movement on the output of domestic goods. On the one hand, the spending effect raises the relative price of home goods and hence induces an increase in the output of these goods. On the other hand, the resource movement effect could reduce the output of home goods. When both mechanisms are effective simultaneously the total impact cannot be determined a priori, and it becomes an empirical issue. In general, however, it seems clear that a boom in an export sector affects the import-competing sector in much the same way as a tariff reduction. It creates or increases domestic production disincentives (or reduces existing domestic production incentives) through unfavorable relative price changes. In comparison, the boom affects the traditional export sector (that is, agriculture) as an export tax increase. It changes the terms of trade so that they are unfavorable for domestic production of agricultural exports by reducing their domestic relative prices.

### Some Dynamics

The above analysis focuses on the long-run effects of a resource boom on the competitiveness of the rest of the economy. The introduction of a monetary sector adds dynamic considerations to these results.

If money is added to the system described above, a resource boom will also affect its supply and demand. In the first place, once the resource sector produces exports, it earns foreign exchange. A boom in that sector will generate a balance-of-payments surplus if it is assumed that an external payments balance existed prior to the boom. When the Central Bank monetizes this balance-of-payments surplus, money supply increases. Second, the increase in income brought about by the boom will lead to an increase in the demand for money because the demand for money is normally positively related to the level of income. Thus the two tendencies could lead to an excess supply of money or an excess demand for it. An excess supply of money implies (by Walras' law) an excess demand for both tradable and nontradable goods—a situation that creates inflationary pressures and depresses the relative price of tradables further. An excess demand for money would have the opposite effect. It is clear that a boom in an export resource can generate a balance-of-payments surplus, and that if this is monetized, there would be an increase in the supply of money as well as inflation. An increase in the general price level that is not matched by an equivalent devaluation would generate a real appreciation of the domestic currency. This appreciation would, in turn, squeeze profitability out of the traditional export and import-competing sectors of the economy.

In summary, the general effects of a resource boom on the traditional export goods sector (in this case agriculture) and the import-competing goods sector (manufacturing) include loss of competitiveness in both exportable and importable goods sectors as revealed by falling relative prices; loss of relative shares (of total output and employment) by the exportable and import-competing sectors; an upward trend in the real wage rate in the tradable goods sector; an upward trend in the general price level; and currency appreciation. The adjustment of the Nigerian economy to the rapid expansion of its oil sector during the 1970s is analyzed below.

## Consequences of the Nigerian Oil Boom

It is generally recognized that the oil boom that accompanied large increases in worldwide petroleum oil prices in 1973/74 and again in 1979/80 has significantly transformed the structure of the Nigerian economy. This transformation is indicated, indirectly, in the growth rates of various sectors since 1960.

The dominance of the oil and minerals sector in the Nigerian economy is demonstrated most clearly, however, by an examination of the structure of merchandise exports, particularly because the external sector is so important in the economy. The share of oil and minerals rose sharply from 8 percent in 1960 to 95 percent in 1981. Agriculture's share dropped from 89 percent in 1960 to 4 percent in 1981. By 1981, oil contributed more than 70 percent of total government revenue.

The Dutch Disease model provides an appropriate handle for analyzing the consequences of structural changes in the economy brought about by the oil boom. This is done by relating the general predictions of the model to the Nigerian experience. The predictions of particular concern in this exercise include the relative loss of output and employment as well as competitiveness by the nonoil tradable goods sectors. Also relevant are the evolution and trends of the exchange rate, real wage rate, and the general price level, all of which are related to the issue of relative sectoral competitiveness in the economy.

### Effects on Sectoral Output and Employment

Structural changes in the economy brought about by the oil boom have implications for sectoral output and employment (Table 8). As the Dutch Disease model predicts, the boom in the oil sector adversely

**Table 8—Changes in sectoral contributions to output, employment, and exports, 1970 and 1982**

| Sector | Share of Output | | Share of Employment | | Share of Exports | |
|---|---|---|---|---|---|---|
| | 1970 | 1982 | 1970 | 1982 | 1970 | 1982 |
| | | | (percent) | | | |
| Agriculture | 48.78 | 22.19 | 75.00 | 59.00 | 71.90 | 2.40 |
| Oil and mining | 10.22 | 24.87 | 0.20 | 0.40 | 15.40 | 97.50 |
| Manufacturing | 7.15 | 5.64 | 15.00 | 17.70 | 12.70 | 0.10 |
| Services | 33.85 | 47.30 | 9.80 | 22.90 | ... | ... |

Sources: Computations are based on data from Nigeria, Federal Office of Statistics, *National Accounts of Nigeria* (Lagos: FOS, Nigeria, 1978); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

affected output of nonoil tradables. Thus, agriculture's contribution to total output declined from about 49 percent in 1970 to 22 percent in 1982. The share of manufacturing fell much less, from 7 percent to nearly 6 percent. But oil's share more than doubled—from 10 percent in 1970 to almost 25 percent in 1982. The service sector gained—as predicted—from the boom, with its relative share of output rising from about 34 percent to 47 percent during the same period.

Changes in sectoral employment exhibited a slightly different pattern. Whereas agriculture's relative contribution to total employment declined, as expected, from 75 percent to 59 percent, the relative share of manufacturing actually increased slightly in spite of the significant decline in this sector's relative contribution to total output. In comparison, the booming oil sector doubled its share of employment, although it still represented less than 1 percent of employment. Services increased its share more than twofold. Relative gains recorded in both of these sectors are consistent with the predictions of the Dutch Disease model.

Changes in the structure of exports most dramatically reflect the impact of the oil boom. As Table 8 shows, agriculture's share of total exports fell sharply from about 72 percent to less than 3 percent, whereas the share of manufactures declined from 13 percent to less than 1 percent. Correspondingly, the share of the oil and mining sector rose from 15 percent to 98 percent.

These changes in sectoral output and employment reflect intersectoral resource shifts in the Nigerian economy, largely in response to the incentive or disincentive effects of relative price changes. The use of a simple model designed for analyzing structural shifts would assist in providing further insights into the effects of the intersectoral movement of resources.[41] This model examines structural changes within a specified period. Suppose that, at the beginning of this period, the value of agricultural output is related to the gross domestic product (GDP) during the time interval so that agriculture ($AS_1$) contributes $b_1$ percent of $GDP_1$. Then, at the end of the period, the value of agricultural output ought, hypothetically, to be $AS_2^1 = b_1$ percent of $GDP_2$ if no structural change has occurred during the period, and $GDP_2$ represents the end-of-the-period value of the GDP. But if any structural change has taken place, the actual value of agricultural output at the end of the period ($AS_2$) will be different from its hypothetical value ($AS_2^1$). In fact the total (actual) change (TC) in the value of agricultural output can be decomposed into two component parts:

[41] A similar model is developed and applied in E. C. Edozien and T. Ademola Oyejide, "Import Restrictions in Nigeria and Their Impact on Imports from Japan," *Nigerian Journal of Economic and Social Studies* 15 (July 1973): 157-170.

$$TC = AS_2 - AS_1 = (AS_2 - AS_2^1) + (AS_2^1 - AS_1), \quad (3)$$

with the structural shift effect (SSE) equal to $(AS_2 - AS_2^1)$, and the overall economic growth effect (EGE) equal to $(AS_2^1 - AS_1)$. In essence, SSE can be identified as the change in a particular sector's share of total GDP that may result from shifts in the distribution of that GDP between the different sectors that contribute to it. EGE, in comparison, reflects the impact on a particular sector of changes in the overall size of the GDP. Thus, given a constant relative sectoral share, particular sectoral (absolute) values may increase or decrease as a result of general expansion or contraction of the GDP. Total change for a given sector is made up of these two parts.

In this scheme, the effect of incentives or disincentives of relative price changes (whether autonomous or policy-induced) are assumed to be captured by the SSE, whereas EGE takes care of the possible expansion or contraction of sectoral output values emanating from a general increase or decline of the GDP during the period. The decomposition achieved by this simple model is obviously not as satisfactory as one would wish. Its implicit reliance on a "normal" growth pattern that assumed proportional growth rates in each sector implies that its application in a situation where sectoral growth rates are known to be uneven poses some problems.[42] But it does produce a general indication of the direction and effects of sectoral shifts even where growth is nonproportional, for example, an economy in which a booming sector coexists with other stagnant or declining sectors.

A crude measure of the effects of structural changes is derived by computing the hypothetical sectoral output values for 1982, using the sectoral 1970 percentage output shares, which are then compared with the actual 1982 sectoral output values. The result shows sectoral gains and losses in values and percentages (Table 9). This table reveals that both agriculture and manufacturing suffered significant losses as a result of these shifts. The agricultural sector absorbed a relative loss of almost 55 percent, while the manufacturing industry sustained a loss of 21 percent. Corresponding to these losses are the substantial gains by the booming oil and mining sector and the services sector. The output of the oil and mining sector increased by about 143 percent over and above its normal growth projection, and the services sector increased about 40 percent. Similarly, Table 10 shows that the impact of sectoral shifts on exports is reflected in large relative losses for agriculture and manufactures. It is fairly clear from these figures that the nonoil tradables,

**Table 9—Effects of sectoral shifts on output, 1970-82**

| Sector | 1970 Actual | 1982 Actual | 1982 Hypothetical | Gain or Loss | Percent of Gain or Loss |
|---|---|---|---|---|---|
| | | | (N million) | | |
| Agriculture | 1,731.3 | 10,410.3 | 22,888.1 | −12,477.8 | −54.5 |
| Oil and mining | 362.7 | 11,670.7 | 4,795.3 | 6,875.4 | 143.4 |
| Manufacturing | 253.8 | 2,647.5 | 3,354.9 | −707.4 | −21.1 |
| Services | 1,201.4 | 22,192.5 | 15,882.7 | 6,309.7 | 39.7 |
| Total GDP | 3,549.3 | 46,921.0 | 46,921.0 | ... | ... |

Sources: Computations are based on data from Nigeria, Federal Office of Statistics, *National Accounts of Nigeria* (Lagos: FOS, Nigeria, 1978); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

[42] For a similar idea, see H. B. Chenery, "Patterns of Industrial Growth," *American Economic Review* (September 1960).

## Table 10—Effects of sectoral shifts on exports, 1970-82

| Sector | 1970 Actual | 1982 Actual | 1982 Hypothetical | Gain or Loss | Percent of Gain or Loss |
|---|---|---|---|---|---|
| | | | (₦ million) | | |
| Agriculture | 238 | 198.6 | 5,900.4 | -5,701.8 | -96.6 |
| Oil and mining | 51 | 8,003.2 | 1,263.8 | 6,739.4 | 533.3 |
| Manufacturing | 42 | 4.6 | 1,042.2 | -1,037.6 | -99.6 |
| Total exports | 331 | 8,206.4 | 8,206.4 | ... | ... |

Sources: Computations are based on data from Nigeria, Federal Office of Statistics, *National Accounts of Nigeria* (Lagos: FOS, Nigeria, 1978); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

particularly agriculture, bore the brunt of the sectoral shifts caused by the oil boom.

Sectoral shifts had similar effects on employment (Table 11). Agriculture suffered a loss of more than 5 million workers or 27 percent, while the services sector gained more than 4 million or 57 percent. Although employment doubled in the booming oil and mining sector, it is not a labor-intensive sector and therefore the impact of this gain was negligible. Manufacturing, which suffered an output loss (Table 9), managed a 15 percent gain in employment.

Shifts among resource sectors bring changes in sectoral output and employment that can be decomposed into structural shifts and economic growth effects. Table 12 presents output data on both components. Although both agriculture and manufacturing suffered large structural shift losses, these were more than compensated for by gains from the economic growth effect. For the oil and mining and the services sectors, the gains derived from both components were cumulative. The services sector accounted for more than 48 percent of the total increase in output, well above the 26 percent share of the booming sector, which was just higher than that of the agricultural sector.

Total change in employment over 1970-82 can also be decomposed by sector (Table 13). The relative loss in the agricultural sector traceable to structural shifts is compensated for by gains through the economic growth effect so that the sector records a small increase in employment. Thus, agriculture had a relative, but not absolute, fall in employment.

As in the case of output, the major overall gainer from changes in employment was the services sector. This sector accounted

## Table 11—Effects of sectoral shifts on employment, 1970-82

| Sector | 1970 Actual | 1982 Actual | 1982 Hypothetical | Gain or Loss | Percent of Gain or Loss |
|---|---|---|---|---|---|
| | | | (million) | | |
| Agriculture | 19.93 | 20.060 | 25.500 | -5.440 | -27.12 |
| Oil and mining | 0.05 | 0.136 | 0.068 | 0.068 | 100.00 |
| Manufacturing | 3.99 | 6.018 | 5.100 | 0.918 | 15.25 |
| Services | 2.60 | 7.786 | 3.332 | 4.454 | 57.21 |
| Total employment | 26.57 | 34.000 | 34.000 | ... | ... |

Sources: Computations are based on data from Nigeria, Federal Office of Statistics, *National Accounts of Nigeria* (Lagos: FOS, Nigeria, 1978); and Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

## Table 12—Components of sectoral shifts in output of the Nigerian economy, 1970-82

| Sector | Components of the Sectoral Shift | | | |
|---|---|---|---|---|
| | Structural Shift Effect | Economic Growth Effect | Total Change | Percent of Change |
| | | (₦ million) | | |
| Agriculture | -12,477.8 | 21,156.8 | 8,679.0 | 20.0 |
| Oil and mining | 6,875.4 | 4,432.6 | 11,308.0 | 26.1 |
| Manufacturing | -707.4 | 3,101.1 | 2,393.7 | 5.5 |
| Services | 6,309.8 | 14,681.1 | 20,991.1 | 48.4 |

Sources: Derived from Tables 8 and 9.

## Table 13—Components of sectoral shifts of employment in the Nigerian economy, 1970-82

| Sector | Components of the Sectoral Shift | | | |
|---|---|---|---|---|
| | Structural Shift Effect | Economic Growth Effect | Total Change | Percent of Change |
| | | (million) | | |
| Agriculture | -5.440 | 5.570 | 0.130 | 1.7 |
| Oil and mining | 0.068 | 0.018 | 0.086 | 1.2 |
| Manufacturing | 0.918 | 1.110 | 2.028 | 27.3 |
| Services | 4.454 | 0.732 | 5.186 | 69.8 |

Sources: Derived from Tables 8 and 11.

for about 70 percent of the increase in total employment compared with just over 27 percent for the manufacturing sector. This analysis thus supports the general proposition that both agriculture and manufacturing tend to suffer a decline in relative shares of total output and employment when a resource boom occurs. In Nigeria, however, the general economic expansion brought about by the oil boom also ensured that the nonoil tradables sectors were spared absolute losses in total output and employment.

### Effects on Sectoral Competitiveness

An analysis of trends in external and internal relative sectoral prices reveals the general pattern of competitiveness in the economy. Starting with the external sector, the external prices of aggregate exports and cocoa exports are deflated by an index of international prices to produce indexes of real export prices (Table 14).

## Table 14—Real prices of exports and terms of trade, 1970-82

| Year | Aggregate Exports | Cocoa Exports | Terms of Trade |
|---|---|---|---|
| | | (1970 = 100) | |
| 1970 | 100.0 | 100.0 | 100.0 |
| 1971 | 126.5 | 69.4 | 130.5 |
| 1972 | 123.9 | 54.8 | 128.5 |
| 1973 | 149.7 | 52.9 | 152.1 |
| 1974 | 337.7 | 69.2 | 341.1 |
| 1975 | 313.7 | 64.9 | 327.0 |
| 1976 | 334.5 | 69.6 | 350.5 |
| 1977 | 347.2 | 121.3 | 363.0 |
| 1978 | 284.9 | 122.3 | 313.3 |
| 1979 | 388.8 | 103.1 | 400.9 |
| 1980 | 596.7 | 59.6 | 605.6 |
| 1981 | 679.1 | 65.2 | 685.7 |
| 1982 | n.a. | 63.2 | n.a. |

Sources: Unit export values for aggregate exports and cocoa are taken from the International Monetary Fund, *International Financial Statistics* (Washington, D.C.: IMF, various years). They are deflated by the composite consumer price index obtained from Nigeria, Federal Office of Statistics, *Economic and Social Statistics Bulletin* (Special Series), January 1984.

The terms of trade improved consistently and substantially during the 1970-81 period. But significant upward movements in the real aggregate export price index, particularly in 1974 and then again in 1979, reflect the upsurge in world oil prices. The price index for cocoa is more relevant. This index shows that the real prices of Nigeria's agricultural exports were depressed from 1970 to 1982 except for 1977-79. Internal price policy developments shown in Table 4 appear not to have adequately compensated for the significant downward trend in real prices of both agricultural export crops and food crops.

Factors contributing to the loss of competitiveness include changes in the rural wage and real exchange rates (Table 15). The nominal rate of exchange declined until 1980, except for 1977 and 1978, and then rose through 1982. The real exchange rate declined through 1970-82 except for 1973. This means that the naira generally appreciated in terms of its external value. Combined with this was a threefold increase in the estimated real rural wage rate. Thus a substantial inflationary pressure strengthened the appreciation of the real exchange rate and, together with a labor cost squeeze, led to a significant loss of competitiveness by the nonoil tradables, particularly agriculture. The adverse effects on agricultural prices of changes in income, inflation, and exchange rates from the oil boom do not appear to have been adequately compensated for through government intervention.

**Table 15—Exchange and rural wage rates, 1970-82**

| Year | Nominal Exchange Rate Index[a] | Real Exchange Rate Index[b] | Real Rural Wage Rate Index[c] | Consumer Price Index |
|---|---|---|---|---|
| | | (1970 = 100) | | |
| 1970 | 100.0 | 100.0 | 100 | 100 |
| 1971 | 100.0 | 83.6 | 153 | 116 |
| 1972 | 93.0 | 65.3 | 213 | 119 |
| 1973 | 93.0 | 114.2 | 260 | 127 |
| 1974 | 88.7 | 77.0 | 283 | 144 |
| 1975 | 87.3 | 52.0 | 300 | 161 |
| 1976 | 88.7 | 64.7 | 283 | 198 |
| 1977 | 90.0 | 84.6 | 276 | 231 |
| 1978 | 91.5 | 74.9 | 265 | 269 |
| 1979 | 84.5 | 68.0 | 289 | 300 |
| 1980 | 77.5 | 74.2 | 271 | 331 |
| 1981 | 83.0 | 62.7 | 233 | 400 |
| 1982 | 103.3 | 70.9 | 232 | 431 |

[a] The nominal exchange rate is the naira price of the U.S. dollar.
[b] The real exchange rate is computed as the nominal exchange rate multiplied by an index of trade-weighted foreign prices of tradables divided by the consumer price index.
[c] The rural wage rate index is taken from Table 1.

# 7

# EFFECTS OF TRADE AND EXCHANGE RATE POLICIES

The poor performance of Nigerian agriculture since the 1970s has evoked various policy responses. Some have taken the form of direct government intervention in agriculture with the aim of influencing the structure of incentives. They include sector-specific infrastructural investments as well as administrative price fixing in agricultural input and output markets. Other more general macroeconomic policies also have direct and indirect incentive effects on agriculture. These policies, particularly trade and exchange rate policy measures, either reinforce or counteract those directed solely at agriculture.

## The Real Exchange Rate and Agriculture

General macroeconomic management policies impinge on agriculture through changes in the real rate of exchange, which plays a critical role in the profitability of both export-oriented and import-competing agriculture. The real rate of exchange measures the real terms of trade between traded and nontraded goods. This rate can be measured in a number of ways. One is the internal price level of tradable goods divided by that of nontradable goods. Another is the nominal exchange rate multiplied by a foreign price index and divided by an internal price index. A third measure is the ratio of the nominal exchange rate to an index of the internal wage rate. In both the second and third measures, the nominal exchange rate is the predominant internal variable in determining the domestic prices of tradables, whereas the wage rate is the primary input into services, which constitute the bulk of nontradables. The first and second measures also approximate each other to the extent that the foreign price index captures the foreign price levels of the country's imported and exported goods, and the domestic price index captures the internal price level of nontraded goods.

For the following analysis, it is convenient to think of the real exchange rate as the ratio of the prices of tradable goods to the prices of nontradables. A fall in the real exchange rate implies that the prices of tradable goods are falling relative to the prices of nontradables. On the other hand, an increase means that the price ratio improves in favor of tradable goods. If the reasonable assumption is made that intersectoral resource flows are sensitive to relative price changes, it is clear that changes in the real rate of exchange would tend to affect intersectoral profitability, which would induce movement of resources between different sectors of the economy. More specifically, a reduction in the real exchange rate would tend to divert resources away from tradables to nontradables, while an increase would accomplish the opposite.

Changes in the terms of trade between tradables and nontradables (or the real rate of exchange) are determined by, among other variables, trade policy and foreign prices. In this case, trade policy refers to changes in import tariffs and export taxes. Domestic trade policy operates largely by creating a wedge between domestic and foreign prices. If an import tariff is imposed, domestic prices of importables will rise above corresponding foreign prices, whereas an export tax reduces domestic prices of exportables relative to foreign prices. The latter change reduces incentives for the domestic production of exportable goods while inducing an increase in domestic demand. This results in reduced exports and a shift of resources away from the exportable sector. If these resources flow into the production of nontradables, the excess supply pressure leads to a decline in

their prices. A fall in the price of nontradables relative to the price of tradables implies an increase in the real rate of exchange. Thus, an increase in the export tax tends to cause an increase in the real rate of exchange, all other things being equal.

Because an increase in import tariffs enables the domestic price of importables to rise above the corresponding foreign price, it increases incentives for their domestic production while reducing their domestic demand. This induces resource movement in favor of importables and away from nontradables. Output of nontradables is reduced and an excess demand exerts upward pressure on their price. When the price of nontradable goods increases relative to the price of tradable goods, the real rate of exchange declines. All things being equal, an increase in import tariffs translates into a fall in the real rate of exchange.

In general, a decline of the real exchange rate is a signal that the terms of trade have worsened against the tradable goods sector and that resources are being diverted to the nontradable goods sector. An increase in the real rate gives an opposite signal. The export crops and import-competing products are tradables, although agriculture also produces nontraded food crops. For this sector, therefore, a decline in the real rate of exchange indicates a reduction in the relative prices of traditional agricultural exports and import-competing products of agriculture. But unlike the manufacturing sector, agriculture is usually not shielded against the impact of the relative price changes implicit in a falling real rate of exchange.

Nigeria's import-substitution-industrialization strategy implies an inward-looking trade regime, which confers substantial protection on import-competing manufacturing activities.[43] This strategy is sustained by a set of high import tariffs, which affect agriculture in a number of ways. First, import tariffs also tax exports and therefore hurt agricultural exports. Second, a policy that protects industry raises the cost of imported agricultural inputs such as machinery, fertilizer, and other chemical inputs. Third, and more pervasive, is the effect of industrial protection on the real rate of exchange. The real exchange rate that maintains external balance at a given rate of industrial protection is lower than the equilibrium real rate that would prevail because an increase in import tariffs corresponds, all things being equal, to a decline of the real rate. Hence, a given level of protection to industry reduces the domestic prices of tradables produced in agriculture relative to the domestic prices of tradables produced in the industrial sector and the prices of nontradable goods. Such relative output price changes also have incentive effects in the factor market. To the extent that the relative price changes encourage increased domestic production of import-competing industrial tradables, incentives are created for labor and other inputs to move out of agriculture into the industrial and nontraded goods sectors.

The labor market provides a particularly critical link between the real exchange rate and agriculture. Declines in the relative price of agricultural output resulting from declines in the real exchange rate are significant whether brought about by the Dutch Disease (as discussed in Chapter 6) or by the protection of industry, or a combination of both, as is the case in Nigeria. The labor market provides the second component of the general squeeze on agriculture resulting from a decline in the real rate of exchange.

Because Nigerian agriculture is labor intensive, the major constraint on production appears to be rural labor shortages, especially during peak periods. Labor is also the main input in the nontradables sector, which includes government, public works, construction, and other services. If the real exchange rate declines so that increased income from expanded oil revenue or more rapid capital inflow is spent on nontradables, and if a certain level of protection is

[43] Nigeria's system of industrial incentives is analyzed in T. Ademola Oyejide, *Tariff Policy and Industrialization in Nigeria* (Ibadan, Nigeria: Ibadan University Press, 1975); J. W. Robertson, *The Structure of Industrial Incentives in Nigeria: 1979-80,* Report 1441-01 (Washington, D.C.: World Bank, 1981); and T. J. Bertrand and J. W. Robertson, *An Analysis of Industrial Incentives and Location in Nigeria* (Washington, D.C.: World Bank, 1978).

provided for the import-competing manufacturing activities, the result will be more favorable terms of trade for nontradables and the protected industrial tradables. Consequently, labor is induced to move out of agriculture. Since the labor supply is finite, that available to agriculture is reduced in relation to its demand, which puts upward pressure on the rural wage rate. This is likely to result in substantial increases in labor costs, which already are a large proportion of total agricultural production costs in Nigeria. A fall in relative output prices and higher relative prices of labor and other agricultural inputs has the effect of reducing the profitability of producing tradable (export and import-competing) goods in agriculture.

## Incidence of Trade and Exchange Rate Policies

The following analysis is based on the postulate that trade and exchange rate policies influence the economy's level and structure of production incentives and that these determine the intra- and intersectoral flow of resources. It is the belief in the potency of production incentives for moving resources between different economic activities that motivated the various price intervention measures discussed in previous parts of this report, particularly Chapter 5.

Until recently, previous studies of incentive systems and corresponding resource flows in the developing countries have concentrated largely on the degree of protection for competing manufacturing activities by trade and exchange rate policies.[44] Although most of these studies did not deal explicitly with the agricultural sector, their conclusions indicate, in general, that prevailing industrial protection policies in the developing countries tend to have adverse, though not necessarily intended, effects on agriculture, particularly its export component. The partial equilibrium approach taken by such studies may have contributed to what seems to be a general underestimation of the adverse effects on agriculture of industrial protection policies, which favored import-competing industrial activities at the expense of the other sectors.

## Analytical Model

Recent theoretical and methodological advances concerning the effects of general trade and exchange rate changes, typified by the work of Dornbusch and Sjaastad, have established that trade and exchange rate policies often have global economywide repercussions substantially different from that intended by policymakers.[45] The effects on agriculture can be quite strong even when such policies are not directed specifically at the sector.

The analytical model that reflects these new developments is that of a simple open economy producing three types of goods—exportables, importables, and home (nontraded) goods. The domestic nominal prices of the tradable goods are determined by their foreign prices, the nominal exchange rate, import duties, and export taxes or subsidies. The domestic nominal prices of nontraded goods are determined by domestic demand and supply factors, which are, in turn, influenced by trade and exchange rate policies through the tradable goods markets.

In this model trade and exchange rate policies are viewed not in terms of their effect on nominal prices but of their impact on relative prices. Import duties and export taxes (or subsidies) affect the structure of domestic prices of importables and export-

[44] Among the most important of these studies are Balassa, *The Structure of Protection in Developing Countries;* I. M. D. Little, et al., *Industry and Trade in Developing Countries* (Oxford: Oxford University Press, 1970); Anne O. Krueger, et al., eds., *Trade and Employment in Developing Countries* (Chicago: University of Chicago Press for the National Bureau of Economic Research, 1981).

[45] Rudiger Dornbusch, "Tariffs and Nontraded Goods," *Journal of International Economics* 4 (1974): 177-185; and Larry A. Sjaastad, "Commercial Policy, True Tariffs, and Relative Prices," in *Current Issues in Commercial Policy and Diplomacy,* ed. J. Black and B. Hindley (New York: St. Martin Press, 1980).

ables relative to the price of nontradable (home) goods. The consequent changes in relative prices are accompanied by complex and pervasive substitution processes in production and consumption, which constitute the real effects of a given set of trade and exchange rate policy changes on intra- and intersectoral resource flows. The analytical framework provides a methodology for isolating and quantifying the sectoral effects of any combination of import tariffs, export taxes, or subsidies in a given trade and exchange rate regime.

Trade and exchange rate policy variables enter the model through the assumption that excess demand for importables ($M^e$), excess supply of exportables ($X^e$), and excess demand for home goods ($H^e$) depend only on relative prices ($P_m/P_h$; $P_x/P_h$) and real income (Y), where $P_m$, $P_x$, and $P_h$ represent the domestic nominal prices of importables, exportables, and home goods, respectively. The domestic relative prices are, in turn, expressed as functions of foreign prices of exportables ($P_{x^*}$) and importables ($P_{m^*}$), the nominal rate of exchange (E), import tariffs (t), and export subsidies (s). The following relationships hold:

$$P_m/P_h = (E/P_h)P_{m^*}(1 + t), \qquad (4)$$

$$P_x/P_h = (E/P_h)P_{x^*}(1 + s), \text{ and} \qquad (5)$$

$$P_m/P_x = P_{m^*}/P_x(1 + t)/(1 + s). \qquad (6)$$

Equation (6) implies that the domestic price of importables relative to the price of exportables is a function of trade policy variables and foreign prices. The imposition of an import tariff raises the domestic nominal price of importables relative to those of exportables and home goods [equations (4) and (6)]. This change in relative prices induces consumers to shift demand away from importables to exportables and home goods. It also induces increased domestic production of import-competing importables. In other words, resources are induced to move away from both exportables and home goods toward importables. In the home goods sector, these processes create a reduction in supply and an increase in demand. The resulting excess demand places an upward pressure on prices until they reach a new supply and demand equilibrium. This position is such that the import tariff has increased the domestic price of importables relative to the price of home goods, but by less than the full amount of the tariff because the nominal price of home goods has also risen somewhat.

To formalize these relationships, all goods can be defined so that their domestic prices are unity with no trade restrictions. If the world prices of importables and exportables are assumed to be constant, the imposition of import duties with a weighted average t and export subsidies whose weighted average is s will set in motion relative price changes and substitution effects. The import duties will cause an increase in the price of importables and a fall in the price of exportables—both relative to the price of home goods. The export subsidies will, in turn, increase the price of exportables and decrease the price of importables—both relative to the price of home goods. In particular, if import duties are larger than export subsidies ($t>s$), the equilibrium price of home goods will rise by an amount that is less than t but greater than s. If d represents the increase in the price of home goods, Sjaastad shows that[46]

$$d = s + \omega(t - s) = \omega t + t(1 - \omega)s, \qquad (7)$$

where $\omega$ represents an incidence parameter, which, as will be shown later, consists essentially of parameters measuring substitution relationships.

The nominal distortion introduced into the economy by trade policy is measured as the difference $(t - s)$, which decomposes into two terms,

$$t - s = (t - d) + (d - s), \qquad (8)$$

with the interpretation that producers in the import-competing sector receive an im-

[46] Sjaastad, "Commercial Policy, True Tariffs, and Relative Prices."

plicit subsidy given by the term (t – d) rather than the nominal import tariff rate t, whereas the remainder (d – s) represents the proportion of the total distortion shifted in the form of an implicit tax on producers of exportables. What governments can determine through their trade policies is the size of the total distortion (t – s). They cannot decide how this is ultimately allocated between the import-competing and exportable sectors of the economy.

This result implies that to protect any one sector, other sectors have to be penalized, and that the degree to which the protection of one sector causes damage to other sectors depends on substitution relationships in production and demand. Thus, an import duty meant for protecting some import-competing manufacturing activities may in fact be shifted partially or completely transformed into a tax on producers of exportables, for example, of agricultural export crops. In the same way, an export subsidy designed primarily to encourage the expansion of the exportables sector may wind up partly or wholly as an import subsidy.

The incidence parameter ($\omega$) referred to in equation (7) is derived explicitly within the framework of the three-sector model in which general equilibrium is implied by either the trade account equilibrium or equilibrium in the home goods market. It is analytically convenient to use the general equilibrium market clearing properties of the home goods sector for determining the equilibrium price relationships among the three sectors. Equilibrium in the home goods sector implies home goods demand ($H^d$) and equals home goods supply ($H^s$):

$$H^d = H^s, \qquad (9)$$

where the home goods demand and supply functions are expressed as

$$H^d = H^d(P_m/P_h, P_x/P_h, Y), \qquad (10)$$

and

$$H^s = H^s(P_m/P_h, P_x/P_h, K, L, T), \qquad (11)$$

where

Y = income (GDP),

K = capital,

L = labor, and

T = technology.

K, L, and T represent the productive capacity of the economy; they can, together with Y, be held for the purpose of examining the comparatively static properties of the model where the primary interest is the movement of relative prices. Thus, after an initial displacement, the system achieves a new equilibrium, where

$$\hat{H}^d = \hat{H}^s = (\eta_m - \epsilon m)(\hat{P}_m/\hat{P}_h) + (\eta_x - \epsilon_x)(\hat{P}_x/\hat{P}_h) = 0. \qquad (12)$$

In this expression, $\eta_m$ and $\eta_x$ represent the demand elasticities for home goods with respect to the prices of importables and exportables, and $\epsilon_m$ and $\epsilon_x$ are the corresponding supply elasticities, whereas the ($\hat{}$) over a variable denotes a proportional change. Equation (12) is then expressed as

$$\gamma m(\hat{P}_h - \hat{P}_m) + \gamma_x(\hat{P}_h - \hat{P}_x) = 0, \qquad (13)$$

where $\gamma m = \eta m - \epsilon m$, $\gamma x = \eta x - \epsilon x$, and

$$\gamma m(\hat{P}_h - \hat{P}_x) + \gamma m(\hat{P}_x - \hat{P}_m) + \gamma x(\hat{P}_h - \hat{P}_x) = 0, \qquad (14)$$

so that

$$(P_h - P_x) = \omega(P_m - P_x), \qquad (15)$$

where $\omega = \gamma m/\gamma m + \gamma x$ (with $0 \leq \omega \leq 1$) is the incidence parameter referred to earlier. Equation (15) is rewritten as

$$d\ln(P_h/P_x) = \omega d\ln(P_m/P_x), \qquad (16)$$

with d representing the derivative of the natural logarithm of the bracketed variables. Upon integration (assuming $\omega$ constant), equation (16) is transformed into

$$\ln(P_h/P_x) = \text{constant} + \omega \ln(P_m/P_x) + \text{error term}, \quad (17)$$

which is the basic regression equation for estimating the numerical value of ω. This equation may be disaggregated as necessary to take account of several exportable and importable subsectors.[47]

## Empirical Results

The ω parameter measures the combined effects of trade and exchange rate changes and shows how the burden of the consequent changes in relative prices is shared among the sectors. The numerical value of ω reflects the proportional change in the price of home goods relative to the price of exportables as a function of the proportional change in the price of importables relative to the price of exportables. In estimating the global and disaggregated forms of the incidence parameter, an important modification is required before equation (17) can be used. Estimation based on time-series data would violate the assumption, made for analytical convenience, of constant income and productive capacity (measured by given stocks of K, L, and T), and of a balanced external account. Hence, income (Y) as measured by GDP and balance of trade (BT) have to be included as additional explanatory variables in the regression equations.

The regression equations are estimated on the basis of annual data for 1960-82. The Cochrane-Orcutt iteration technique was used to correct for first-order autocorrelation for all estimated regression results in Tables 16 to 21. In addition to total exports (XT), estimates are produced for agricultural exports (XA), oil exports (XO), cocoa exports (XC), groundnut exports (XG), and palm kernel exports (XP). The price indexes for imports and the various export categories are constructed from corresponding unit import and unit export values in naira. For each of these export categories, three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the composite urban and rural consumer price index. The third proxy of home goods is the index of the minimum (legally established) wage rate (H3). Sources and data for all of the variables used are given in the Appendix, Tables 24-30.

**Table 16—Regression results for total exports**

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XT})$ | $\ln(P_{H2}/P_{XT})$ | $\ln(P_{H3}/P_{XT})$ |
| Constant | 0.6612 | −0.7805 | 0.1112 |
| | (2.3912) | (−2.0020) | (2.4610) |
| $\ln(P_M/P_{XT})$ | 0.9021 | 0.8351 | 0.5518 |
| | (12.5960) | (7.8673) | (6.2113) |
| ln Y | −0.1156 | 0.1885 | 0.1953 |
| | (−2.3916) | (2.7395) | (2.5286) |
| BT | −0.0213 | −0.0342 | 0.0011 |
| | (−3.4712) | (−4.7201) | (0.0631) |
| $\bar{R}^2$ | 0.985 | 0.924 | 0.743 |
| D.W. | 1.564 | 1.358 | 1.958 |
| ρ | 0.425 | 0.972 | −0.044 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XT}$ is the price of total exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

The statistical characteristics for all regression results are quite good. The adjusted fit is reasonably good, being more than 0.7 in all but three of the 18 equations. Although the estimated coefficients for the additional variables Y and BT are mixed in sign and level of statistical significance, estimates of the incidence parameter are

[47] Disaggregation follows Jorge García García, *The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia: 1953-1978*, Research Report 24 (Washington, D.C.: International Food Policy Research Institute, 1981). In this study, only exports are disaggregated as indicated subsequently in the text.

**Table 17—Regression results for agricultural exports**

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XA})$ | $\ln(P_{H2}/P_{XA})$ | $\ln(P_{H3}/P_{XA})$ |
| Constant | 0.5208 | 0.4401 | −0.9532 |
| | (2.5580) | (1.4798) | (−3.5151) |
| $\ln(P_M/P_{XA})$ | 0.8221 | 0.8165 | 0.8435 |
| | (10.0050) | (6.6262) | (6.2941) |
| ln Y | −0.0195 | 0.2225 | 0.0156 |
| | (−3.1556) | (4.7816) | (2.3401) |
| BT | −0.0867 | 0.0531 | 0.0045 |
| | (−2.5136) | (0.0050) | (1.4406) |
| $\bar{R}^2$ | 0.860 | 0.881 | 0.851 |
| D.W. | 1.894 | 1.385 | 1.507 |
| $\rho$ | 0.728 | 0.417 | 0.916 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XA}$ is the price of agricultural exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

**Table 18—Regression results for oil exports**

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XO})$ | $\ln(P_{H2}/P_{XO})$ | $\ln(P_{H3}/P_{XO})$ |
| Constant | 0.4437 | 0.0413 | 0.2310 |
| | (1.1528) | (1.1636) | (3.1322) |
| $\ln(P_M/P_{XO})$ | 0.6327 | 0.5143 | 0.6911 |
| | (8.8168) | (10.1500) | (7.9597) |
| ln Y | 0.1971 | −0.0895 | 0.0369 |
| | (2.1517) | (−1.2602) | (3.1029) |
| BT | −0.0349 | −0.0066 | 0.0963 |
| | (−4.8149) | (−0.6298) | (6.3714) |
| $\bar{R}^2$ | 0.941 | 0.887 | 0.881 |
| D.W. | 1.449 | 1.958 | 1.515 |
| $\rho$ | 0.966 | 0.139 | 0.502 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XO}$ is the price of oil exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

statistically significant in all cases at conventional levels.

The estimated numerical values obtained for $\omega$ for all categories of exports and home goods are displayed in Table 22. These results indicate that the degree of incidence of trade and exchange rate policies on exports is very high. The relatively high estimates of the incidence parameter may be partly explained by the fact that annual data were used to generate them; intrayear variations in relative prices are therefore not adequately captured. However, a high omega value would, in general, imply that Nigeria's home goods and importables are fairly close substitutes. It would also reflect that Nigeria's exportables, being primarily resource-based (oil) or agricultural products, are fairly inelastic in supply. Hence, they tend to absorb a large proportion of the tariff incidence in the form of reduced rents to the natural resource or land. Note also that the inclusion of interaction terms in the estimated regression equations for disaggregated exports does not alter the basic results, as can be seen in Table 31 of the Appendix.[48] For total exports, estimates of the incidence parameter range from 0.55 to 0.90; they are more concentrated for agricultural exports, varying from 0.82 to 0.84. The range of $\omega$ for cocoa exports is between 0.83 and 0.86. The incidence is much lower for oil exports (0.51 to 0.69), while that for groundnut exports is from 0.61 to 0.82, and that of palm kernels lies between 0.66 and 0.79.

These results imply that a tariff on imports falls almost entirely on producers of exportable goods. It may be inferred, therefore, that Nigeria's prevailing trade and ex-

[48] For similar results, see Larry A. Sjaastad and K. W. Clements, "The Incidence of Protection: Theory and Measurement," a paper prepared for the Conference on the Free Trade Movement in Latin America, Hamburg, F. R. Germany, June 21-24, 1981.

**Table 19—Regression results for cocoa exports**

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XC})$ | $\ln(P_{H2}/P_{XC})$ | $\ln(P_{H3}/P_{XC})$ |
| Constant | 0.6940 | −0.7375 | −1.0891 |
| | (2.9564) | (−2.4492) | (−2.9855) |
| $\ln(P_M/P_{XC})$ | 0.8558 | 0.8290 | 0.8325 |
| | (9.0584) | (5.3451) | (4.3671) |
| ln Y | −0.1131 | 0.1911 | 0.2248 |
| | (−3.0612) | (4.1040) | (4.0637) |
| BT | −0.0191 | 0.0846 | 0.0159 |
| | (−3.1247) | (5.4286) | (0.8893) |
| $\bar{R}^2$ | 0.938 | 0.577 | 0.489 |
| D.W. | 1.640 | 1.458 | 1.726 |
| ρ | 0.579 | 0.377 | 0.254 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XC}$ is the price of cocoa exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

**Table 20—Regression results for groundnut exports**

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XG})$ | $\ln(P_{H2}/P_{XG})$ | $\ln(P_{H3}/P_{XG})$ |
| Constant | 0.6379 | −0.7046 | −0.9202 |
| | (2.5506) | (−1.9973) | (−3.7115) |
| $\ln(P_M/P_{XG})$ | 0.8221 | 0.6522 | 0.6079 |
| | (6.8622) | (3.5098) | (3.5540) |
| ln Y | −0.1070 | 0.1863 | 0.2004 |
| | (−2.6360) | (3.2589) | (5.0756) |
| BT | 0.0876 | −0.0300 | 0.0405 |
| | (6.2254) | (−3.7407) | (1.4066) |
| $\bar{R}^2$ | 0.927 | 0.853 | 0.597 |
| D.W. | 1.588 | 1.391 | 1.839 |
| ρ | 0.617 | 0.973 | 0.132 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XG}$ is the price of groundnut exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

change rate policies, which are designed largely to protect import-competing manufacturing activities, have also substantially reduced the relative incentive to produce export goods vis-à-vis home goods. The oil sector has had a significant adverse effect on agriculture as shown in Chapter 6.

The Dutch Disease phenomenon has penalized import-competing manufacturing activities and especially agricultural exports because of agriculture's labor constraints. In addition, general trade and exchange rate policies have given more explicit import protection to manufacturing activities than agriculture. Consequently it seems clear that both the Dutch Disease and trade and exchange rate policies have had the cumulative effect of taxing agriculture.

Because most of the protection for the import-competing activities has been at the expense of the exportable (primarily agricultural) sector, an export subsidy for agricultural crops could be justified as a means of ameliorating the adverse effect of industrial protection. Instead, Nigeria's agricultural exports have traditionally been taxed. However, an examination of protection policy for cocoa, groundnuts, and palm kernel for 1979-82 indicates that in more recent years export tax rates have declined, and in some cases negative taxes for subsidies have occurred. Thus, nominal rates of protection increased from negative rates through most of the 1960s and 1970s to positive values for some commodities by 1982.

These nominal protection rates are reproduced in Table 23 with their signs reversed to represent direct export taxes. Import tariffs in Nigeria between 1979 and 1982 averaged about 50 percent.[49] Given

[49] Given the predominant use of quantitative restrictions during most of the 1970-82 period, the equivalent uniform ad valorem tariff is likely to have been considerably higher than the average nominal tariff of 50 percent. Therefore, the average tax burden is probably much higher than the estimates presented in the text.

## Table 21—Regression results for palm kernel exports

| Independent Variable | Dependent Variable | | |
|---|---|---|---|
| | $\ln(P_{H1}/P_{XP})$ | $\ln(P_{H2}/P_{XP})$ | $\ln(P_{H3}/P_{XP})$ |
| Constant | 0.4196 | 0.4996 | −0.9282 |
| | (2.1572) | (1.0944) | (−3.4431) |
| $\ln(P_M/P_{XP})$ | 0.6618 | 0.6956 | 0.7936 |
| | (4.4772) | (4.2285) | (2.6831) |
| ln Y | −0.0662 | 0.2895 | 0.2209 |
| | (−2.0591) | (4.7089) | (4.9149) |
| BT | −0.0189 | −0.0305 | 0.0749 |
| | (−3.0390) | (−3.7378) | (2.4998) |
| $\bar{R}^2$ | 0.853 | 0.870 | 0.788 |
| D.W. | 2.031 | 1.131 | 1.414 |
| ρ | 0.600 | 0.731 | 0.431 |

Notes: Three variables are used as proxies for home goods. The price indexes for housing (H1) and food (H2) are the relevant components of the consumer price index. The third proxy (H3) is the index of the minimum wage rate. $P_{XP}$ is the price of palm kernel exports.

$P_M$ is the price of imports and $P_X$, that of exports; Y is income; and BT is the trade balance.

The numbers in parentheses are standard deviations.

## Table 22—Range of values for omega estimates

| Export | Estimated Omega Values |
|---|---|
| Total exports | 0.55 – 0.90 |
| Agricultural exports | 0.82 – 0.84 |
| Oil | 0.51 – 0.69 |
| Cocoa | 0.83 – 0.86 |
| Groundnuts | 0.61 – 0.82 |
| Palm kernel | 0.66 – 0.79 |

Sources: Derived from Tables 16-21.
Note: Omega is the name given to the incidence of protection parameter.

the estimated average incidence parameter values of 0.834 for cocoa, 0.715 for groundnuts, and 0.725 for palm kernels, the corresponding implicit taxes on these commodities emanating from the average import tariff are 42.25 percent, 35.75 percent, and 36.25 percent respectively. Total taxes by commodity are made up of the direct (explicit) and implicit taxes. The total export tax falling on cocoa producers was as high as 80 percent when the implicit component of the tax was accounted for. This tax burden dropped to 18 percent in 1981 but rose again to 16 percent by 1982. The subsidies provided in 1981 and 1982 were insufficient to offset, in a countervailing sense, the adverse effects of the import tariff. Similarly, groundnuts carried a tax burden of about 37 percent in 1979, instead of an explicit tax of 1 percent. In spite of a subsidy of 18 percent in 1981, the total tax rate was 18 percent in 1981. Palm kernel producers appeared to have fared slightly better. But in general, it is clear that because of the very high value of the incidence parameter, the protection provided in recent times for agricultural export crops has not sufficiently compensated for the adverse effects of the prevailing trade and exchange rate policies.

## Table 23—Explicit, implicit, and total taxes on cocoa, groundnuts, and palm kernel exports, 1979-82

| Crop/Taxes | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| | | (percent) | | |
| Cocoa | | | | |
| Explicit | 38.00 | 8.00 | −33.00 | −26.00 |
| Implicit | 42.25 | 42.25 | 42.25 | 42.25 |
| Total | 80.25 | 50.25 | 9.25 | 16.25 |
| Groundnuts | | | | |
| Explicit | 1.00 | 11.00 | −18.00 | n.a. |
| Implicit | 35.75 | 35.75 | 35.75 | 35.75 |
| Total | 36.75 | 46.75 | 17.75 | n.a. |
| Palm kernel | | | | |
| Explicit | −3.00 | 0 | −31.00 | n.a. |
| Implicit | 36.25 | 36.25 | 36.25 | 36.25 |
| Total | 33.25 | 36.25 | 5.25 | n.a. |

# 8

# CONCLUSIONS

Nigeria's agriculture suffered an extraordinary decline during the period 1970-82, as the oil boom provided the impetus for a high overall economic growth rate, but it has remained an important sector of the economy. Although its share of both GDP and total exports fell substantially, agriculture still accounted for about 60 percent of the total labor force at the end of the period. Shortages and high costs of labor have played a central role in agriculture's decline. Nigeria's agriculture is unusually labor-intensive. Availability of off-farm employment opportunities, especially in the rapidly growing urban services sector, combined with the introduction of universal primary education, added impetus to the rapid urbanization. Increased dependence on hired labor and sharp increases in the rural wage rate without a matching increase in productivity meant that labor became a powerful constraint on agricultural output growth.

The rather severe increase in the cost of agricultural inputs does not appear to have been sufficiently offset by corresponding increases in output prices. The retail food price index rose about 18 percent above the composite (rural and urban) consumer price index (CPI) during 1970-82, but farm-gate prices for domestic food crops declined relative to the overall CPI. Producer prices for export crops, however, alternately rose and fell throughout 1970-82.

Agriculture's poor performance attracted increased policy attention to the need to provide effective growth incentives for the sector within the general policy goal of maintaining viable nonoil tradables during and after the oil era. To achieve this goal, Nigeria adopted a wide range of policies directed toward improving agriculture's performance. One set is aimed at improving the farmers' production environment. This included productivity-increasing measures such as research and development for seed improvement and multiplication, creation and adaptation of technology, provision of extension services, subsidized rural credit, and rural infrastructural development. Other policy measures dealt with the size and price of agricultural imports and exports, and the prices, importation, and domestic production of agricultural inputs (particularly fertilizers and capital equipment). The last two categories relate to the trade and exchange rate regime, which is the primary focus of this study.

Nigerian trade and exchange rate policies have had pervasive effects on agriculture through their influence on the sizes and prices of agricultural imports and exports as well as intermediate agricultural inputs and agricultural capital equipment. Estimates of effective protection indicate that agricultural price intervention measures implemented largely through the trade and exchange rate regime appear to have increasingly protected domestic production of agricultural crops from external competition. For most of 1960-82, however, this simply means that the rate of implicit taxation of agricultural exports was decreasing. Export crops did not begin to receive positive production incentives through protection until the early years of the 1980s.

Import-competing food crops appear to have been receiving substantial protection against imports since at least the mid-1960s. However, these policies have been implemented largely through quantitative restrictions. It is not clear whether the level of protection resulted from deliberate policy choice or was a by-product of other macroeconomic concerns (for example, the balance of payments). In any case, because of the way they have traditionally been used in Nigeria, quantitative import restriction measures involve wide short-term fluctuations in magnitude and direction. Hence the levels of protection apparently provided for

food and export crops did not often indicate consistency and stability in policy intentions. In fact, a careful analysis of the relationship between the observed changes in the domestic export and cocoa export price indexes, the nominal exchange rate, and the nominal rate of protection implies that the realized levels of protection are rather insignificant. They are therefore not necessarily conducive to positive and sustained output supply response.

The oil boom had a major impact on intersectoral resource movements, particularly for agriculture. The boom, which originated from large increases in crude petroleum oil prices in 1973/74 and 1979/80, has substantially transformed the structure of the Nigerian economy. The general effects of the boom on the nonoil tradable sectors as analyzed through various models of the Dutch Disease include loss of competitiveness by the nonoil tradable sectors (as revealed, for instance, by falling relative prices); unfavorable intersectoral resource movements resulting in loss of relative shares of total output and employment; an upward trend in the real wage rate; and an appreciation of the currency. The structural transformation of an economy brought about by a resource boom involves not only substantial intersectoral shifts but also an overall expansion. This study reveals that the agricultural and manufacturing sectors (that is, the nonoil tradables) both had significant losses of output and employment shares between 1970 and 1982, whereas the services sector had impressive gains. When total changes in output and employment are analyzed, however, it is clear that all sectors gained, in varying degrees, from Nigeria's oil boom. In agriculture and manufacturing, lower relative shares of output and employment were largely compensated for by gains resulting from overall economic growth. The services sector was the primary overall beneficiary of the boom during 1970-82. This sector absorbed almost half of the total increase in output and about 70 percent of the increase in employment.

The loss of competitiveness by the nonoil tradables predicted by the Dutch Disease model shows up clearly when the international and domestic prices of agricultural crops are compared. For instance, the index of real cocoa export prices remained depressed between 1970 and 1982, while the real domestic prices of food and export crops showed a significant downward trend. Agriculture's general loss of competitiveness largely arises from trends in the real rural wage and exchange rates. Again as predicted by the Dutch Disease model, the real exchange rate declined through 1970-82, except for 1973. In terms of its external value, the naira appreciated more than 50 percent between 1973 and 1980 while the estimated real rural wage rate tripled. This condition led inevitably to agriculture's substantial loss of competitiveness.

The extent to which the prevailing trade and exchange rate policies offered effective incentives to agriculture can be established by analyzing estimates of the incidence of protection parameter, which is called omega. This shows how the burden of changes in relative prices are shared among various sectors of the economy. The numerical value of omega reflects the proportional change in the price of home goods relative to the price of exportables as a function of the proportional change in the price of importables relative to the price of exportables. In this study, the numerical estimates of omega range from 0.55 to 0.90. These estimates indicate that the degree of incidence of trade and exchange rate policies on exports is high. This implies that the impact of a tariff on imports falls almost entirely (55 to 90 percent) on producers of exportable (agricultural) products, either because Nigeria's home goods and importables are fairly close substitutes or because Nigeria's exportables, which are primarily resource-based and agricultural, are fairly inelastic in supply.

The effects of developments in the oil sector have been more adverse to agriculture than to manufacturing, mainly because of agriculture's labor constraints. In addition, general trade and exchange rate policies have offered greater explicit import protection to manufacturing. Consequently, it seems clear that both the Dutch Disease phenomenon and the trade and exchange rate regime taxed

rather than protected agriculture. Subsidies provided in the 1980s for several agricultural export crops have not been sufficient to offset the adverse effects of the oil boom and general trade and exchange rate policies.

Various studies confirm that the supply of Nigerian agricultural crops is responsive to price changes.[50] But the fairly low short-run price-elasticity estimates obtained would appear to indicate that relative price changes induced by trade and exchange rate policies are probably not sufficient to bring about a substantial and sustained expansion of agricultural output in Nigeria. In other words, changes in the trade and exchange rate regime would need to be accompanied by new technologies, improved seeds, development and expansion of rural infrastructure, and other productivity-raising rural investment in order to significantly boost long-term growth performance.

The Nigerian economy remains essentially open in spite of the pervasive use of quantitative import restrictions and foreign exchange controls. The tradability of most of the agricultural products means that agricultural prices, trade policy, and exchange rate changes are inevitably linked. Hence, agricultural price intervention alone is unlikely to be effective. Furthermore, if only the industrial sector is protected, much of the burden of adjustment will fall on agriculture. Therefore, in designing policies it is important to ensure that the full implications of trade and exchange rate policies for both agricultural and nonagricultural sectors are explicitly recognized and taken into consideration.

The Nigerian oil boom has had a significant adverse effect on agricultural incentives. The capital flows associated with the boom, which depressed the real rate of exchange, and the domestic spending and resource movements progressively turned the terms of trade against the nonoil tradables, particularly agriculture. Unlike manufacturing, these sectors had no effective countervailing, sector-specific protection from the trade and exchange rate regime. The adverse effects of the oil boom on the nonoil tradables could have been ameliorated by exporting surplus capital or by accumulating foreign exchange reserves, foreign investments, and repayment of foreign debts. This would have enabled the country to gradually repatriate the surplus funds over time to finance domestic investment with sufficiently high yields without causing wide fluctuations or sharp depression in the real rate of exchange. Unfortunately, Nigeria's management of its oil revenue appears to have been the direct opposite of this. Hence, the adverse effect of movement in the real exchange rate on the largely unprotected agricultural tradables sector was progressively worsened by further foreign indebtedness. Between 1976 and 1982, total public and publicly guaranteed disbursed debt rose from less than U.S. $1 billion to almost U.S. $12 billion. Perhaps this monumental macroeconomic management failure can best be explained as a lack of political will to resist generalized and special-interest pressures.

Additional questions of significant policy relevance arose during this study. One concerns the extent to which trade and exchange rate policies need to be accompanied by other policies, particularly in the institution, technology, and infrastructure areas, in order to achieve agricultural output growth targets. Another major unanswered question is the relationship between changes in the real exchange rate and the labor flow between rural and urban activities. The impact of real exchange rate changes on production incentives must recognize and take account of the labor market as a means of translating apparent protection into effective incentives. These and related questions call for more detailed research for a more comprehensive understanding of the forces that currently impede the expansion of agricultural output in Nigeria.

[50] Results of these studies can be found in M. E. Bond, "Agricultural Responses to Prices in Sub-Saharan African Countries," *IMF Staff Papers* 30 (December 1983): 703-726.

# APPENDIX: SUPPLEMENTARY TABLES

## Table 24—Producer prices of major agricultural crops, 1963-82

| Year | Cocoa | Cotton | Groundnuts | Palm Kernels | Palm Oil | Soybeans | Benniseed |
|---|---|---|---|---|---|---|---|
| | | | | (N/metric ton) | | | |
| 1963 | 212 | 88 | 78 | 54 | 80 | 46 | 90 |
| 1964 | 232 | 92 | 82 | 54 | 80 | 46 | 92 |
| 1965 | 122 | 94 | 84 | 56 | 82 | 46 | 92 |
| 1966 | 172 | 90 | 84 | 54 | 80 | 46 | 92 |
| 1967 | 182 | 86 | 74 | 56 | 82 | 46 | 92 |
| 1968 | 192 | 110 | 50 | 58 | 82 | 36 | 94 |
| 1969 | 262 | 108 | 55 | 57 | 81 | 37 | 75 |
| 1970 | 295 | 108 | 63 | 57 | 81 | 37 | 81 |
| 1971 | 297 | 108 | 67 | 61 | 89 | 37 | 81 |
| 1972 | 297 | 122 | 75 | 61 | 89 | 37 | 81 |
| 1973 | 354 | 132 | 80 | 61 | 89 | 47 | 105 |
| 1974 | 487 | 156 | 145 | 124 | 204 | 60 | 169 |
| 1975 | 660 | 308 | 250 | 150 | 265 | 99 | 264 |
| 1976 | 660 | 308 | 250 | 150 | 265 | 99 | 264 |
| 1977 | 660 | 308 | 275 | 150 | 295 | 130 | 264 |
| 1978 | 1,030 | 330 | 350 | 150 | 355 | 135 | 290 |
| 1979 | 1,200 | 330 | 350 | 180 | 450 | 135 | 300 |
| 1980 | 1,300 | 400 | 420 | 200 | 495 | 150 | 300 |
| 1981 | 1,300 | 465 | 420 | 200 | 495 | 155 | 315 |
| 1982 | 1,300 | 510 | 450 | 230 | 495 | 175 | 315 |

Sources: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years); Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years); and Central Bank of Nigeria, *Economic and Financial Review*, various issues.

## Table 25—Output indexes of major agricultural crops, 1965-80

| Year | Cocoa | Groundnuts | Rice | Maize | Cassava | Yams |
|---|---|---|---|---|---|---|
| | | | | (1965 = 100) | | |
| 1965 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1966 | 100.0 | 85.6 | 87.9 | 91.5 | 102.5 | 100.0 |
| 1967 | 89.1 | 78.8 | 170.0 | 88.8 | 104.9 | 89.1 |
| 1968 | 71.9 | 91.7 | 155.8 | 85.4 | 107.6 | 71.9 |
| 1969 | 82.8 | 93.3 | 143.5 | 126.7 | 110.5 | 82.8 |
| 1970 | 114.2 | 79.9 | 151.4 | 116.8 | 124.7 | 114.2 |
| 1971 | 96.3 | 78.5 | 171.3 | 84.4 | 112.1 | 96.3 |
| 1972 | 90.3 | 47.8 | 197.4 | 95.7 | 116.9 | 90.3 |
| 1973 | 80.5 | 17.7 | 215.0 | 49.2 | 117.3 | 80.5 |
| 1974 | 80.1 | 20.2 | 231.8 | 109.3 | 122.3 | 80.1 |
| 1975 | 80.5 | 14.2 | 227.4 | 113.3 | 129.6 | 80.5 |
| 1976 | 61.8 | 25.3 | 170.9 | 116.9 | 132.0 | 61.8 |
| 1977 | 75.7 | 15.3 | 180.1 | 121.4 | 29.5 | 75.7 |
| 1978 | 59.9 | 22.8 | 227.4 | 133.1 | 128.3 | 59.9 |
| 1979 | 67.4 | 27.2 | 264.9 | 134.9 | 128.3 | 67.4 |
| 1980 | 65.5 | 28.2 | 320.1 | 139.4 | 134.4 | 65.5 |

Sources: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years); Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years); and Central Bank of Nigeria, *Economic and Financial Review*, various issues.

## Table 26—Indexes of domestic prices of major food crops, 1965-80

| Year | Rice | Maize | Cassava | Yams |
|---|---|---|---|---|
| | | (1965 = 100) | | |
| 1965 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1966 | 126.2 | 146.0 | 175.3 | 148.0 |
| 1967 | 115.1 | 95.7 | 119.0 | 107.8 |
| 1968 | 114.5 | 100.7 | 103.3 | 100.0 |
| 1969 | 126.1 | 144.4 | 67.0 | 117.0 |
| 1970 | 141.6 | 137.0 | 116.4 | 157.0 |
| 1971 | 185.0 | 189.2 | 181.0 | 248.0 |
| 1972 | 149.6 | 174.0 | 135.0 | 219.5 |
| 1973 | 140.1 | 152.0 | 112.4 | 268.0 |
| 1974 | 180.3 | 165.0 | 123.5 | 612.2 |
| 1975 | 198.4 | 204.0 | 213.0 | 422.1 |
| 1976 | 265.3 | 312.0 | 307.0 | 489.6 |
| 1977 | 313.6 | 443.0 | 414.4 | 826.2 |
| 1978 | 373.0 | 443.1 | 539.2 | 1,111.2 |
| 1979 | 400.0 | 500.0 | 520.0 | 1,120.0 |
| 1980 | 465.4 | 546.5 | 509.3 | 1,132.0 |

Sources: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years); Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years); and Central Bank of Nigeria, *Economic and Financial Review*, various issues.

## Table 27—Price indexes for selected export crops, 1960-82

| Year | All Agricultural Exports | Cocoa | Groundnuts | Palm Kernels |
|---|---|---|---|---|
| | | (1960 = 100) | | |
| 1960 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1961 | 87.6 | 69.2 | 102.3 | 100.0 |
| 1962 | 81.9 | 61.5 | 95.5 | 86.2 |
| 1963 | 87.6 | 64.7 | 88.6 | 86.2 |
| 1964 | 88.2 | 67.9 | 88.6 | 93.1 |
| 1965 | 89.6 | 74.4 | 93.2 | 93.1 |
| 1966 | 89.3 | 39.1 | 93.2 | 93.1 |
| 1967 | 91.6 | 57.1 | 93.2 | 96.6 |
| 1968 | 94.1 | 60.3 | 70.5 | 100.0 |
| 1969 | 108.0 | 85.3 | 63.6 | 98.3 |
| 1970 | 104.7 | 94.6 | 71.6 | 98.3 |
| 1971 | 96.9 | 95.2 | 76.1 | 105.2 |
| 1972 | 85.4 | 95.2 | 85.2 | 105.2 |
| 1973 | 149.4 | 113.5 | 90.9 | 213.8 |
| 1974 | 201.5 | 156.1 | 164.8 | 258.6 |
| 1975 | 136.4 | 211.5 | 284.1 | 258.6 |
| 1976 | 169.3 | 211.5 | 284.1 | 258.6 |
| 1977 | 340.4 | 330.1 | 312.5 | 258.6 |
| 1978 | 293.7 | 330.1 | 329.5 | 310.3 |
| 1979 | 293.1 | 384.6 | 397.7 | 310.3 |
| 1980 | 204.4 | 384.6 | 397.7 | 344.8 |
| 1981 | 233.4 | 416.7 | 477.3 | 344.8 |
| 1982 | 214.2 | 416.7 | 477.3 | 344.8 |

Sources: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years); Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years); and Central Bank of Nigeria, *Economic and Financial Review*, various issues.

## Table 28—Index of agricultural production, 1975-82

| Year | Aggregate Index | All Crops | Staple Crops | Other Crops |
|---|---|---|---|---|
| | | (1975 = 100) | | |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1976 | 93.9 | 88.8 | 88.7 | 89.1 |
| 1977 | 88.7 | 79.7 | 75.7 | 94.0 |
| 1978 | 88.5 | 77.7 | 70.8 | 99.1 |
| 1979 | 87.2 | 73.9 | 64.4 | 104.0 |
| 1980 | 89.4 | 77.7 | 67.6 | 109.4 |
| 1981 | 92.4 | 84.3 | 70.1 | 115.1 |
| 1982 | 91.9 | 85.5 | 74.7 | 120.3 |

Source: Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years).

## Table 29—Guaranteed minimum prices for food crops, 1976-82

| Year | Millet/ Sorghum | Maize | Rice (Paddy) | Rice (Milled) | Gari (Processed Cassava) | Yams | Beans | Wheat |
|---|---|---|---|---|---|---|---|---|
| | | | | (N/metric ton) | | | | |
| 1976 | 80 | 95 | 185 | ... | 85 | 85 | ... | ... |
| 1977 | 110 | 130 | 240 | 400 | 110 | 120 | 180 | ... |
| 1978 | 110 | 130 | 240 | 400 | 110 | 120 | 180 | ... |
| 1979 | 220 | 200 | 329 | 570 | ... | ... | 345 | 235 |
| 1980 | 220 | 200 | 329 | 570 | ... | ... | 345 | 235 |
| 1981 | 231 | 210 | 345 | 596 | ... | ... | 362 | 247 |
| 1982 | 231 | 210 | 400 | 596 | ... | ... | 362 | 280 |

Sources: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years); Central Bank of Nigeria, *Annual Report and Statement of Accounts* (Lagos: CBN, various years); and Central Bank of Nigeria, *Economic and Financial Review*, various issues.

## Table 30—Domestic price indexes, 1960-82

| Year | Exportables ($P_x$) | Importables ($P_m$) | Home Goods | | |
|---|---|---|---|---|---|
| | | | Housing ($P_{h1}$) | Food ($P_{h2}$) | Minimum Wage ($P_{h3}$) |
| | | (1960 = 100) | | | |
| 1960 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1961 | 91.8 | 100.0 | 104.9 | 108.0 | 100.0 |
| 1962 | 87.4 | 99.5 | 106.0 | 114.7 | 100.0 |
| 1963 | 91.8 | 101.3 | 108.6 | 106.5 | 100.0 |
| 1964 | 76.3 | 103.1 | 109.4 | 110.7 | 100.0 |
| 1965 | 76.3 | 104.9 | 116.9 | 113.6 | 100.0 |
| 1966 | 76.3 | 107.4 | 119.5 | 130.5 | 100.0 |
| 1967 | 76.3 | 107.6 | 124.4 | 120.1 | 100.0 |
| 1968 | 76.3 | 106.9 | 125.8 | 112.6 | 100.0 |
| 1969 | 76.3 | 110.5 | 129.3 | 133.9 | 100.0 |
| 1970 | 76.3 | 115.9 | 137.3 | 164.4 | 137.0 |
| 1971 | 104.3 | 131.4 | 147.0 | 211.4 | 137.0 |
| 1972 | 104.3 | 143.5 | 156.9 | 216.6 | 137.0 |
| 1973 | 424.1 | 161.1 | 156.4 | 223.6 | 137.0 |
| 1974 | 406.2 | 235.3 | 160.7 | 258.9 | 462.0 |
| 1975 | 421.7 | 255.7 | 203.1 | 367.7 | 462.0 |
| 1976 | 465.3 | 257.4 | 212.3 | 464.7 | 462.0 |
| 1977 | 531.5 | 270.9 | 258.3 | 539.4 | 462.0 |
| 1978 | 522.0 | 303.4 | 266.9 | 632.1 | 462.0 |
| 1979 | 713.9 | 405.6 | 339.0 | 682.8 | 462.0 |
| 1980 | 115.4 | 474.6 | 360.1 | 734.7 | 769.0 |
| 1981 | 1,366.9 | 390.0 | 351.7 | 920.1 | 769.0 |
| 1982 | 1,592.0 | 367.2 | 365.6 | 1,001.6 | 962.0 |

Source: Nigeria, Federal Office of Statistics, *Economic and Social Statistics* (Lagos: FOS, various years).
Note: Housing and food prices are components of the composite consumer price index.

## Table 31—Supplementary regression results for aggregate exports

| Independent Variable | Dependent Variables | | | | |
|---|---|---|---|---|---|
| | $\ln(P_{HI}/P_{XA})$ | $\ln(P_{HI}/P_{XC})$ | $\ln(P_{HI}/P_{XO})$ | $\ln(P_{HI}/P_{XG})$ | $\ln(P_{HI}/P_{XP})$ |
| Constant | 0.2513<br>(2.4090) | 0.5960<br>(2.8610) | 0.4123<br>(1.0182) | 0.3920<br>(1.2571) | 0.8532<br>(2.1705) |
| $\ln(P_M/P_{XA})$ | 0.8205<br>(5.5514) | ... | ... | ... | ... |
| $\ln(P_M/P_{XC})$ | ... | 0.8368<br>(7.9840) | ... | ... | ... |
| $\ln(P_M/P_{XO})$ | ... | ... | 0.5539<br>(4.7192) | ... | ... |
| $\ln(P_M/P_{XG})$ | ... | ... | ... | 0.7539<br>(5.4066) | ... |
| $\ln(P_M/P_{XP})$ | ... | ... | ... | ... | 0.6893<br>(3.0573) |
| $\ln(P_{XA}/P_X)$ | −0.0035<br>(−0.2316) | ... | ... | ... | ... |
| $\ln(P_{XC}/P_X)$ | ... | −0.0013<br>(−0.0531) | ... | ... | ... |
| $\ln(P_{XO}/P_X)$ | ... | ... | 0.0145<br>(0.0002) | ... | ... |
| $\ln(P_{XG}/P_X)$ | ... | ... | ... | −0.0030<br>(−0.0600) | ... |
| $\ln(P_{XP}/P_X)$ | ... | ... | ... | ... | −0.0405<br>(−1.0039) |
| $\bar{R}^2$ | 0.750 | 0.823 | 0.872 | 0.897 | 0.733 |
| D.W. | 1.920 | 1.708 | 1.045 | 1.891 | 1.741 |

# BIBLIOGRAPHY


Armington, Paul. "A Theory of Demand for Products Distinguished by Place of Production." *IMF Staff Papers* 16 (March 1969): 159-178.

Balassa, Bela. *The Structure of Protection in Developing Countries.* Baltimore: Johns Hopkins University Press, 1981.

Bautista, Romeo M. "Effects of Trade and Exchange Rate Policies on Export Production Incentives in Agriculture: The Philippines." Washington, D.C.: International Food Policy Research Institute, 1984 (mimeographed).

Bertrand, Trent J. and Robertson, J. W. *An Analysis of Industrial Incentives and Location in Nigeria.* Washington, D.C.: World Bank, 1978.

Bhagwati, Jagdish N. *Anatomy and Consequences of Exchange Control Regimes.* Cambridge, England: Ballinger for National Bureau of Economic Research, 1978.

Bond, Marion E. "Agricultural Responses to Prices in Sub-Saharan African Countries." *IMF Staff Papers* 30 (December 1983): 703-726.

Central Bank of Nigeria. *Annual Report and Statement of Accounts.* Lagos: Central Bank, various years.

_____. "Note on the Determination of Exchange Rate." Internal memo, October 1975.

Chenery, Hollis B. "Patterns of Industrial Growth." *American Economic Review* (September 1960): 624-654.

Consortium for the Study of Nigerian Rural Development. *Strategies and Recommendations for Nigerian Rural Development, 1969-1985.* Lagos: CSNRD, 1969.

Corden, William Max. *The Theory of Protection.* Oxford: Clarendon Press, 1971.

Corden, William Max and J. Peter Neary. "Booming Sector and De-Industrialization in a Small Open Economy." *Economic Journal* 92 (December 1982): 825-847.

Dervis, Kemal; de Melo, Jaime; and Robinson, Sherman. *General Equilibrium Models for Development Policy.* Washington, D.C.: World Bank, 1982.

Dornbusch, Rudiger. "Tariffs and Nontraded Goods." *Journal of International Economics* 4 (May 1974): 177-185.

Edozien, E. C. and Oyejide, T. Ademola. "Import Restrictions in Nigeria and Their Impact on Imports from Japan." *The Nigerian Journal of Economic and Social Studies* 15 (July 1973): 157-170.

Eicher, Carl E. "The Dynamics of Long-Term Development in Nigeria." *Journal of Farm Economics* 49 (December 1967).

Eicher, Carl E. and Baker, Doyle C. *Research on Agricultural Development in Sub-Saharan Africa—A Critical Survey.* International Development Paper No. 1. East Lansing, Mich.: Michigan State University, 1982.

Food and Agricultural Organization of the United Nations. *Agricultural Development in Nigeria, 1965—1980.* Rome: FAO, 1966.

García, Jorge García. *The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia, 1953-1978.* Research Report 24. Washington, D.C.: International Food Policy Research Institute, 1981.

Gregory, R. G. "Some Implications of the Growth of the Mineral Sector." *Australian Journal of Agricultural Economics* 20 (August 1976): 71-91.

Harberger, Arnold C. "Dutch Disease: How Much Sickness, How Much Boom?" *Resources and Energy* 5 (No. 1, 1983), p. 1.

Helleiner, Gerald K. *Peasant Agriculture, Government, and Economic Growth.* Homewood, Ill.: Richard D. Irwin, 1966.

Idachaba, Francis S., et al. *The Green Revolution: A Food Production Plan for Nigeria.* Lagos: Federal Ministry of Agriculture, 1980.

International Monetary Fund. *International Financial Statistics.* Washington, D.C.: IMF, various years.

Johnston, Bruce F. and Mellor, John W. "The Role of Agriculture in Economic Development." *American Economic Review* 51 (September 1961): 566-593.

Kilby, Peter. *Industrialization in an Open Economy: Nigeria 1945-1966.* Cambridge, England: Cambridge University Press, 1969.

Krueger, Anne O., et al., eds. *Trade and Employment in Developing Countries.* Chicago: University of Chicago Press for the National Bureau of Economic Research, 1981.

Little, I. M. D.; Scitovsky, Tibor; and Scott, Maurice. *Industry and Trade in Developing Countries.* Oxford: Oxford University Press, 1970.

Nigeria, Agricultural Projects Monitoring, Evaluation, and Planning Unit. "Project Completion Reports." Federal Department of Rural Development, Kaduna, 1982.

Nigeria, Federal Office of Statistics. *Economic and Social Statistics Bulletin* (Special Series) (January 1984).

_____. *National Accounts of Nigeria.* Lagos: FOS, 1978.

Norman, David W. *Economic Analysis of Agricultural Production and Labor Utilization among the Hausa in the North of Nigeria.* African Rural Employment Paper No. 4. East Lansing, Mich.: Michigan State University, 1973.

Norton, Roger D. *Pricing Policy Analyses for Nigerian Agriculture.* Washington, D.C.: World Bank, 1983.

Ogunfowora, O. "Conceptualizing Increased Resource Demand and Product Supply Inducing Policies in Peasant Agriculture." *Nigerian Journal of Economic and Social Studies* (March 1973).

Ojo, M. O. "Food Supply in Nigeria." *Economic and Financial Review* 15 (December 1977): 12-19.

Okrume, Godwin E. *Foreign Trade and the Subsistence Sector in Nigeria—The Impact of Agriculture Exports on Domestic Food Supplies in a Peasant Economy.* New York: Praeger, 1973.

Oyejide, T. Ademola. "Exchange Rate Policy for Nigeria: Some Options and Their Consequences." Paper presented at the Workshop on Management of Nigeria's Foreign Exchange Resources, University of Ibadan, March 15, 1985.

_____. "Food Policy and the Choice of Trade Regime." In *Accelerating Food Production Growth in Sub-Saharan Africa.* Edited by John W. Mellor, Christopher L. Delgado, and Malcolm J. Blackie. Baltimore: Johns Hopkins University Press for the International Food Policy Research Institute, forthcoming.

_____. *Tariff Policy and Industrialization in Nigeria.* Ibadan, Nigeria: Ibadan University Press, 1975.

Robertson, James W. "An Analysis of Agricultural Trade and Subsidy Policies in Nigeria." World Bank Country Policy Department, Washington, D.C., August 1983 (mimeographed).

_____. *The Structure of Industrial Incentives in Nigeria: 1979-80.* Report 1441-01. Washington, D.C.: World Bank, 1981.

Siebert, Horst, ed. *The Resource Sector in an Open Economy.* Berlin: Springer-Verlag, 1984.

Sjaastad, Larry A. "Commercial Policy, True Tariffs and Relative Prices." In *Current Issues in Commercial Policy and Diplomacy.* Edited by John Black and Brian Hindley. New York: St. Martin's Press, 1980.

Sjaastad, Larry A. and Clements, K. W. "The Incidence of Protection: Theory and Measurement." Paper presented at the Conference on the Free Trade Movement in Latin America, Haus Rissen, Hamburg, Germany, June 21-24, 1981.

Teal, Francis. "The Supply of Agricultural Output in Nigeria." *Journal of Development Studies* 19 (January 1983): 191-206.

Tshibaka, Tshikala B. "Effects of Nigerian Trade Policies on the Agriculturai Sector, 1955/56-1975/76." Ph.D. thesis: University of Ibadan, 1979.

_____. "Effects of Nigerian Trade Policies on the Structure of Incentives to Agriculture in Zaire." Washington, D.C.: IFPRI, June 1985 (mimeographed).

Valdés, Alberto and Siamwalla, Ammar. "Foreign Trade Regimes, Exchange Rate Policy and the Structure of Incentives for Agriculture: Issues and Policies." Washington, D.C.: IFPRI, 1983 (mimeographed).

Warr, Peter G. "Exchange Rate Protection in Indonesia." *Bulletin of Indonesian Economic Studies* 20 (August 1984): 53-89.

World Bank. *Accelerated Development in Sub-Saharan Africa: An Agenda for Action.* Washington, D.C.: World Bank, 1981.

_____. "Large Scale Farming and Mechanisation." *Nigerian Agricultural Sector Review.* Supporting Paper 19. June 29, 1979.

_____. *Toward Sustained Development in Sub-Saharan Africa: A Joint Program of Action.* Washington, D.C.: World Bank, 1984.

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T. Ademola Oyejide is head of the Department of Economics at the University of Ibadan, Nigeria.

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